

JANUARY

MODERN MACHINE SHOP

1955

MODERN Machine Shop

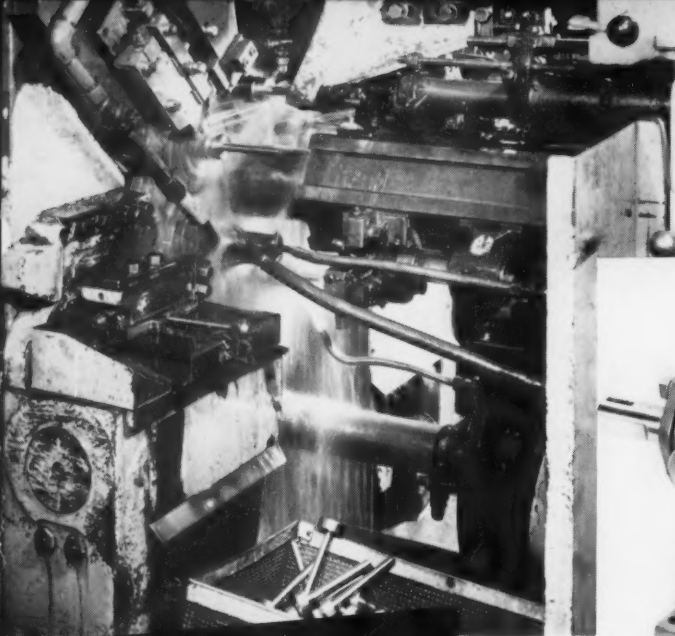
JANUARY, 1955



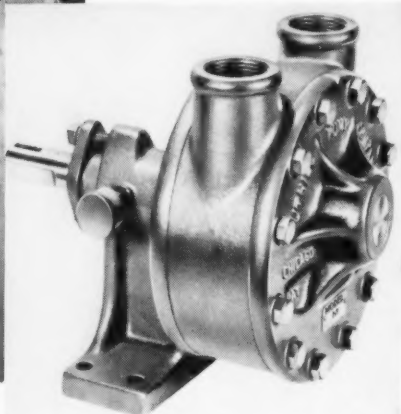
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FOR HIGH SPEEDS • HEAVY LOADS • LONGER LIFE

NORMA-HOFFMANN BEARINGS CORP'N, STAMFORD, CONN., FOUNDED 1911
PRECISION BALL, ROLLER AND THRUST BEARINGS

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AUTOMATIC screw machine producing parts for Tuthill industrial pumps, like the typical Model M shown below. Dual-purpose *Texaco Cleartext Oil B* has been used successfully for seven years as cutting oil and machine lubricant.



SEVEN YEARS OF SAVINGS

TUTHILL PUMP COMPANY

Chicago, started using *Texaco Cleartext Oil B* seven years ago. And they're glad they did. Says E. M. Voelker, Superintendent:

"*Texaco Cleartext Oil* got us out of our cutting oil troubles, and has kept us out. And though materials and operations may change, we know we can count on

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By switching to *Texaco Cleartext Oil B* as dual-purpose cutting-lubricating oil in automatic screw machines, as a cutting oil for external milling and for hobbing small gears, Tuthill eliminated oil wastage and the necessity for frequent oil changes—and *sharply increased production between tool grinds.*

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to help you do all your machining better, faster and at lower cost. Let a *Texaco Lubrication Engineer* specializing in machining help you select the proper ones for your operation.

Just call the nearest of the more than 2,000 *Texaco Distributing Plants* in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



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**CUTTING, GRINDING,
SOLUBLE AND
HYDRAULIC OILS**

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MODERN Machine Shop

contents

VOLUME 27

NUMBER 8

JANUARY, 1955

Over the Editor's Desk	80
Features in This Issue	83
High Production Applications of Resistance Welding	84
By C. D. Shultheis	
Essentials in Good Gage Practice, Part I	100
By C. W. Kennedy	
Machining Stainless Steel	110
By G. J. Stevens	
Streamlining the Accident Prevention Program	116
By Alfred M. Cooper	
How Good Is Your Production Control?	138
By Charles A. Koepke	
Drilling Cross Holes in Shafts	148
By F. E. Riley	
Three-Dimensional Milling Setup Speeds Tool Job	154
By Gilbert C. Close	
Ideas from Readers	158 to 166
Modern Equipment at Work	
—Broaching Stellite Turbine Brackets	174
—Machining Blade Tip Contours of 165-Ton Turbine Propeller Runner ..	175
—Broaching Kingpin Holes	182
—Blanking and Redrawing Cans Automatically	184
—Carbide Step Mills Adapted to Handle 13-Ft. Spars	188
—Ford Transmission Gears Finished in High Speed Shaving Setup	192
—Measuring Surface Plate Flatness	194
—Vacuum Cleaner Part Production Increased with Automatic Pressure Staking Method	196
Departments	
News of the Industry	202
New Shop Equipment	236
Services Directory	322
“Where to Get It”	324
Editorial	332
Index to Advertisements	334
Advertising Representatives	173

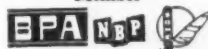
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Gardner Publications, Inc.
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LANDIS THREAD ROLLING MACHINE

NOW

Available!

LANDIS is now offering a revolutionary new machine for producing threads, not available anywhere else in the Western Hemisphere—the LANHYROL Thread Rolling Machine.

The LANHYROL produces strong, accurate threads of excellent finish by the chipless, cold-forming process—and offers unequalled output, flexibility, and range coverage:

- *** It will produce left- and right-hand threads of all types (except square), including UNC, UNF, Acme, worm, and many special forms.
- *** It will thread all diameters from 3/16" to 3".
- *** Threads are rolled by four distinct methods—Infeed, Thrufeed, Continuous, and Reciprocal. The rolling method used is determined by the length and type of thread and the design and hardness of the workpiece.
- *** Threads can be produced to Class 2 and 3 fit by Continuous Rolling, and to Class 4 fit by Infeed, Thrufeed, and Reciprocal Rolling.
- *** Production rates are high. They vary with the individual operation, but for example—600 pieces per hour, rolling 7/8" 9 pitch UNC threads 1 1/4" long on 4140 steel of 29C Rockwell hardness, using Infeed Rolling with semi-automatic operation and manual loading.
- *** Hopper equipment, automatic operation, and auxiliary equipment for special threads is available.

The LANHYROL Thread Rolling Machine is an important new addition to The Landis Line of Threading Equipment developed by more than 50 years of research and experiment. Additional information on request—please send specifications and ask for Bulletin E-60.

LANDIS Machine COMPANY

WAYNESBORO • PENNSYLVANIA • U.S.A.

419

Hammond OF KALAMAZOO
GOOD MACHINERY SINCE '82



Model 454

SINGLE POINT TOOL FINISHER

NOW — it is possible to finish single point carbide tools.

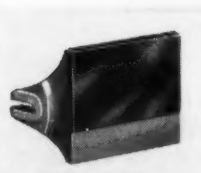
Without diamond wheels

Without highly skilled operators

The Model 454 Single Point Tool Finisher is for final finishing of carbide tools with an abrasive belt, after rough grinding with a silicon carbide wheel. It can also be used to excellent advantage for light grinding and finishing *high speed* steel tools.

Using abrasive belts in place of diamond wheels means a *low cost* initial investment. Also *eliminates* the *risk* of *substantial loss* due to *damage* to *diamond wheels*.

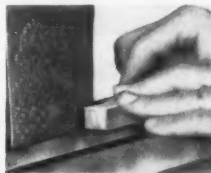
"Seeing is Believing." Clip this ad to your letterhead. We will arrange for you to use a Model 454. No obligation.



Carbide faced platen.



Finishing clearance angles.

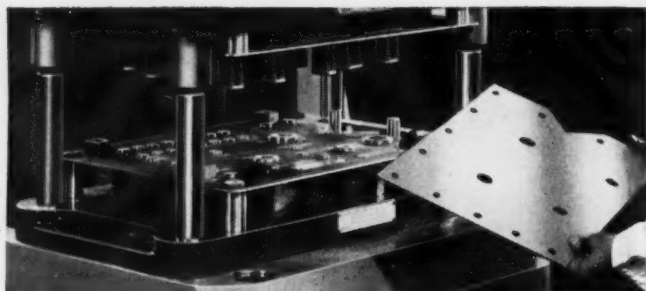


Finishing tops of tools.

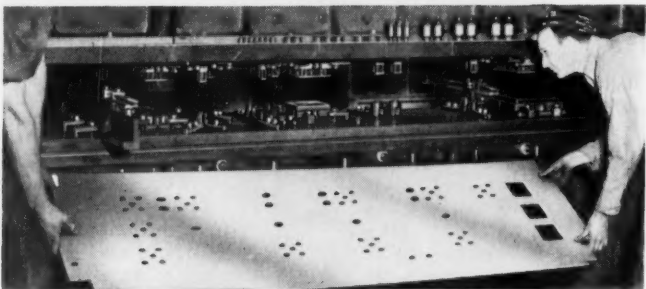
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INC.

1615 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

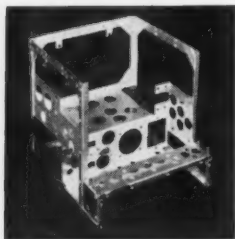
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2,000
PLANTS**
*are making up
their Metal
Perforating Die
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methods*



WHISTLER **MAGNETIC PERFORATING** DIES



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COSTS FROM
COAST TO COAST**

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Farrel supplies these units in a wide range of ratios and capacities. Designs include single, double, and multiple reduction units, speed-change units having two or more selective speeds, right angle drives, and drives to meet special requirements. Ask for Bulletin 449.

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and What it...

...Means to YOU...

**HIGH
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TWO FLUTE

THREE FLUTE

FOUR FLUTE

**LONG
LIFE**



The major portion of production at Melin Tool Company is devoted to End Mills. When you specify MELIN...you know your order is receiving personal attention. There are no priorities in other divisions.

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Outright purchase?

Should I Lease?

Lease with option to buy?

Buy on extended payments?

**What about
the new tax laws?**

**How can I know when to
replace machines?**



This New Gisholt Bulletin Will Help You

Recently, a lot of things have been happening which tend to confuse the outlook for buyers of machine tools and other industrial equipment. So Gisholt prepared this booklet to deal with the most important of them. The aim is to help you find the wisest answers in your particular case.

The booklet discusses leasing and time payment plans, makes cost comparisons, discusses depreciation under the new tax codes, replacement programs and the MAPI formula for machine replacement. A copy of this booklet is yours for the asking. No obligation, of course. Use the coupon.



GISHOLT
MACHINE COMPANY

Madison 10, Wisconsin



The Gisholt Round Table represents the collective experience of specialists in the machining, surface finishing and balancing of round or partly round parts. Your problems are welcome here.

**TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES**

Gisholt Machine Company
1219 E. Washington Ave., Madison 10, Wis.
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- ☐ Please send me a copy of your new booklet on extended-payment and leasing plans.
☐ Please have a Gisholt representative call on me.

Name.....Title.....

Company name.....

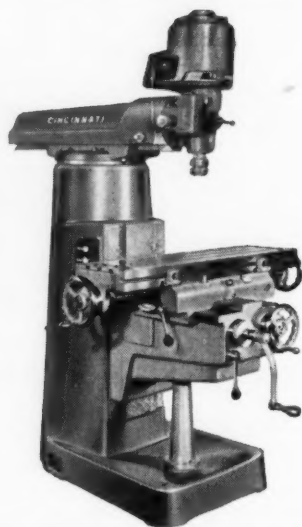
Street address.....

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Everyone is talking about
the **NEW**
CINCINNATI TOOLMASTER
MILLING MACHINE

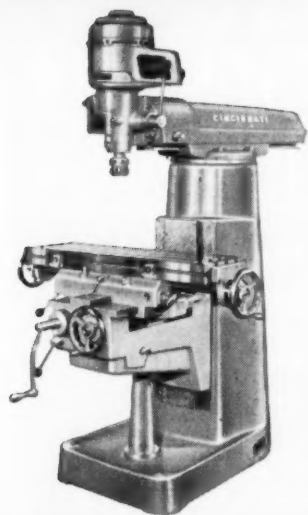


Style 1B Toolmaster Milling Machine. Equipped with 1 hp spindle head; collet chuck type spindle nose, capacity $\frac{1}{8}$ " to 1" shank cutters; power feed to quill; worm positioning of swivel head.



CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



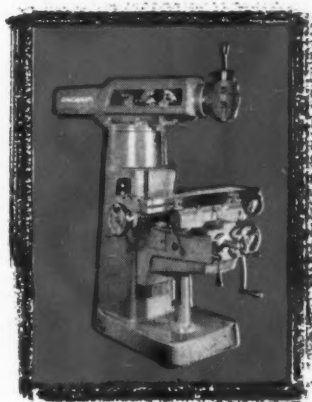
Style 1B Toolmaster Milling Machine. Cincinnati rectangular overarm, square gibbed saddle-knee bearing, extra wide knee bearing on column face . . . these and other features constitute exceptionally sturdy construction for maximum hp cuts.

Meet the newest member of Cincinnati Milling's extensive line of machine tools . . . the Toolmaster. There are three styles of these sturdy toolroom milling machines:

- 1A—Manual feed to quill
- 1B—Power feed to quill
- 1C—Heavy duty spindle head

Toolmaster Milling Machines constitute a new opportunity to reduce costs in shops of all sizes; in toolrooms, metal pattern shops, contract machine shops, tool and die shops. You can depend upon any machine tool bearing the name plate of The Cincinnati Milling Machine Co. Would you like to know more about this new Toolmaster? Write for new four-color catalog, No. M-1870.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



Style 1C Toolmaster Milling Machine. Equipped with 2 hp heavy duty spindle head; built-in motor; 8 spindle speeds; No. 40 standard spindle nose.





**If you want
a jig borer...**

**better see the
plus features
in the KNIGHT**

No. 50

★
SPECIFICATIONS

- Spindle speeds, 16—40 to 2000 RPM
- Boring feeds—infinitely variable, .0005"—.010"
- Vertical capacity—28"
- Table travel—longitudinal 28", cross 18"
- Table feeds—dial type, 16
- Table feeds—per minute, 5' 16" to 20"
- Table rapid traverse—both directions, 100"
- Horsepower—7½
- Weight—8100 lbs.

W. B. KNIGHT MACHINERY COMPANY
3922 W. Pine Blvd. • St. Louis 8, Mo.

ATTACH TO
COMPANY
LETTERHEAD

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Name

Title

☐ Send data on Knight's 20" & 42" Rotary Tables.

The BIG ADVANTAGE of the Knight No. 50 lies not only in its ability to do precision boring and drilling, but in its versatility for performing a wide range of other difficult milling and machining operations without transferring the workpiece from one machine to another. Much of the layout work and preliminary drilling are eliminated, and the whole job is finished quicker on the No. 50.

In addition to making work transfers unnecessary, setup time is reduced by half or more—output is greatly increased—and fewer high-priced manhours are required on each job.

Exclusive on the No. 50 is the dial-controlled infinitely variable spindle feeds. Extra-long travel of the precision roller bearing-mounted one-piece spindle gives this versatile machine another plus feature. Extra-rugged and careful construction promise exceptional accuracy. Convenient quick-action controls and full-vision work areas make operation simple and easy.

Send Coupon For Catalog



Efficiency in Cutting-off is Important

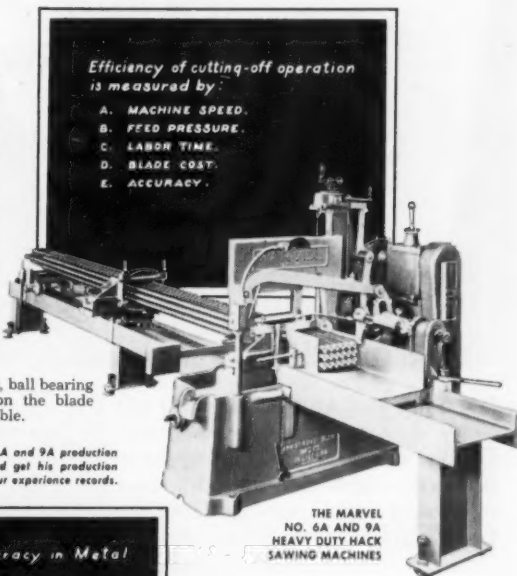
Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.

- A. Are all-ball-bearing and provide a quick return; therefore they run **FASTER** than others on the same work.
- B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.
- C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.
- D. Use a non-breakable high speed hack-saw blade—the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.
- E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.

Efficiency of cutting-off operation is measured by:

- A. MACHINE SPEED.
- B. FEED PRESSURE.
- C. LABOR TIME.
- D. BLADE COST.
- E. ACCURACY.



THE MARVEL NO. 6A AND 9A HEAVY DUTY HACK SAWING MACHINES

Formula for Accuracy in Metal Sawing:

$$\text{ACCURACY} = \left(\frac{\text{Length}}{\text{Straightness}} \right) \left(\frac{\text{Squareness}}{\text{Straightness}} \right) \left(\frac{\text{Blade Rigidity}}{\text{Squareness}} \right) \left(\frac{\text{Blade Tautness}}{\text{Straightness}} \right)$$



Write for catalog C-55—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL High-Speed-Edge Hack Saw Blades and Hole Saws.

The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts any machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable**. These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.



ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

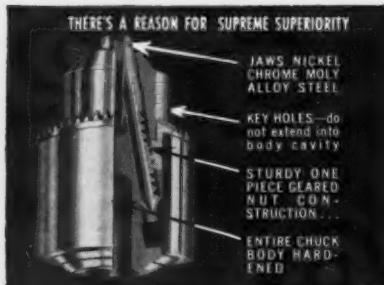
"We've tried them all...
SUPREME is the best
 chuck made"



This is the kind of testimonial we get every day on our Supreme Brand Chucks. Users report getting more production, more accurate work, more all-around satisfactory performance from Supreme. One fellow down in Texas even writes that he removes all chucks except Supreme that come on new tools he buys and replaces them with Supreme. He says—"We do

some tough jobs and only from Supreme Chucks do we get really top service."

This kind of enthusiasm warrants your attention. Ask your distributor to let you try a Supreme Brand Chuck on one of your own machines. You'll find out in a hurry why more and more tool experts are saying—"Supreme is the best chuck made."



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Supreme Chucks are used by 21 out of 24 leading power drill manufacturers on all or a portion of their output.



Supreme Chucks

BRAND

2222 S. Calumet Ave., Chicago 16, Illinois

HISEY Drill Grinder for both...

"BOY SIZE" and "MAN SIZE"

Sharpening



**HOLDER FOR
DRILLS 1/16"
TO 3/8"**

**HOLDER FOR
DRILLS UP
TO 2 1/2"**

*(This side can also be arranged
for wet grinding)*

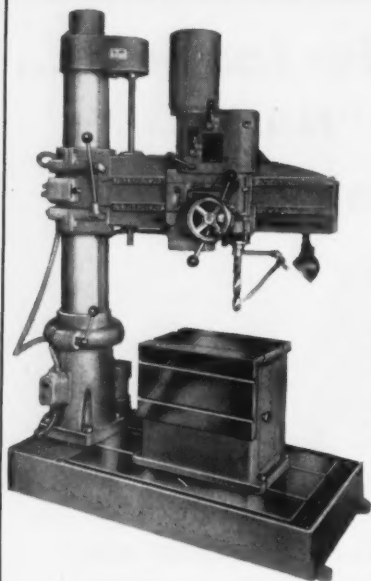
Grinds ALL your Drills { small
AVERAGE
LARGE

You don't send a boy to do a man's job...neither is the reverse economical. But, with two drill holders ONE *Hisey* Drill Grinder conveniently, quickly, and economically handles ALL drill grinding jobs . . . even with inexperienced operators. A sharp, correctly ground drill . . . (1) drills faster (2) drills more holes per grind (3) drills to exact size (4) reduces breakage (5) increases life of drill by removing less metal when sharpening.

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Grinders and Buffers, Tool Post Grinders
and Disc Grinders.**





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(SWEDISH MADE)

RADIAL DRILLS

Bench and Floor Type

Geared Head

DRILL PRESSES

Arboga machines embody all the traditional workmanship of Swedish Machine Tools. *Very favorably priced.*

Many machines in plants all over the United States, where they are very popular and well accepted.

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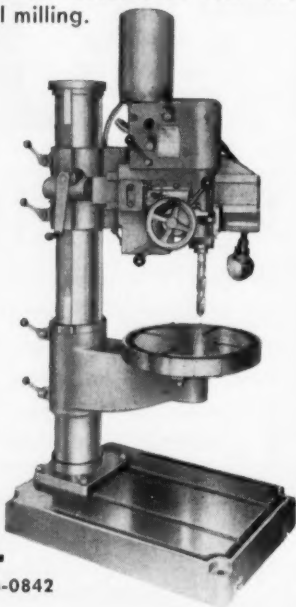
W. F. Wolf Machinery Co.
2910 Santa Fe Avenue
Los Angeles 58, Calif.
Tel. Logan 3321

*Inquiries from dealers outside
above territories invited, these
should be sent to:*

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Manufacturer's exclusive U. S. Representatives



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cuttin'
fool!**



Light
heavy-weight
cutting torch
**It's a
TRIPLE
THREAT**

NEW

Smith's Cutting Torch

- ★ **Does the work of a heavy-duty torch but is LIGHT and easy to handle**

Cuts anything from tomato cans to 14" steel (using proper tips). Yet it is light-weight and perfectly balanced. A brute for performance but easy on the operator. We put into this torch what you and other operators asked for.

- ★ **Slip-In-Tips — no wrenches needed.**

Just slip the tip in, spin the nut with your fingers and you're ready to go. How could anything be easier? Try it yourself and see.

- ★ **3 inter-changeable controls—quick change from one to the other in less than 1 minute**



1. Over lever.



2. Trigger.

3. Under Lever
as shown
at right

No matter what type of cutting jet control you prefer, you have it in this torch—and you can switch from one to the other any time you want. Adaptable to any personal likes or techniques. Reduces number of torches needed to accommodate all operators' requirements.

- ★ **No slag . . . cuts clean.**

The new Smith Tips with this torch give you clean, knife-line cuts with narrow kerf and almost complete absence of slag. Operator does not have to waste time cleaning up his cuts. Speeds up production. Want a demonstration?

This new torch ingeniously combines more operating advantages than any you have ever seen. Trade tests to date have been sensational.

Write for details

SMITH WELDING EQUIPMENT CORP.

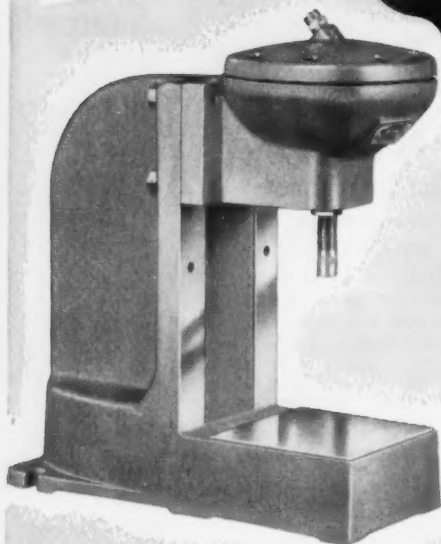
Dept. MMS-162

2633 S. E. 4th St.

Minneapolis, Minn.

NEW!

Speedy



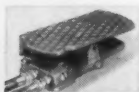
1 TON Heavy Duty AIR PRESS

No. 80

only \$85

This useful, high quality AIR PRESS is the last word in air power engineering—the result of 34 years of specialization in diaphragm compression. Extremely sturdy, it does dozens of jobs formerly handled by expensive presses—and does them more quickly, easily and economically. Operated by Speedy Foot Control, Hand, or Fingertip Valves. Order from your mill supply house or write direct.

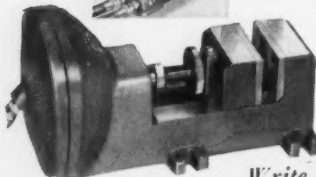
- ★ Heavy grey iron casting, machined surfaces.
- ★ Power factor—15 times air line pressure of 5 to 150 lbs.
- ★ Throat clearance to center of 10" diam. circle.
- ★ Ram clearance 0 to 5", stroke $\frac{5}{8}$ ", table 5" x 5".



◀ SPEEDY AIR VISE No. 60

New improved design. Jaws open to 3". 15 times air line pressure. Complete with Foot Control Valve, Air Hose and Fittings.

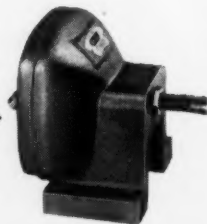
\$44.00



SPEEDY AIR RAM No. 70 ▶

Mounts in any position. Compact, extremely sturdy. Exerts gentle pressure to one ton thrust. 6½" high, 5¼" wide.

\$35.00



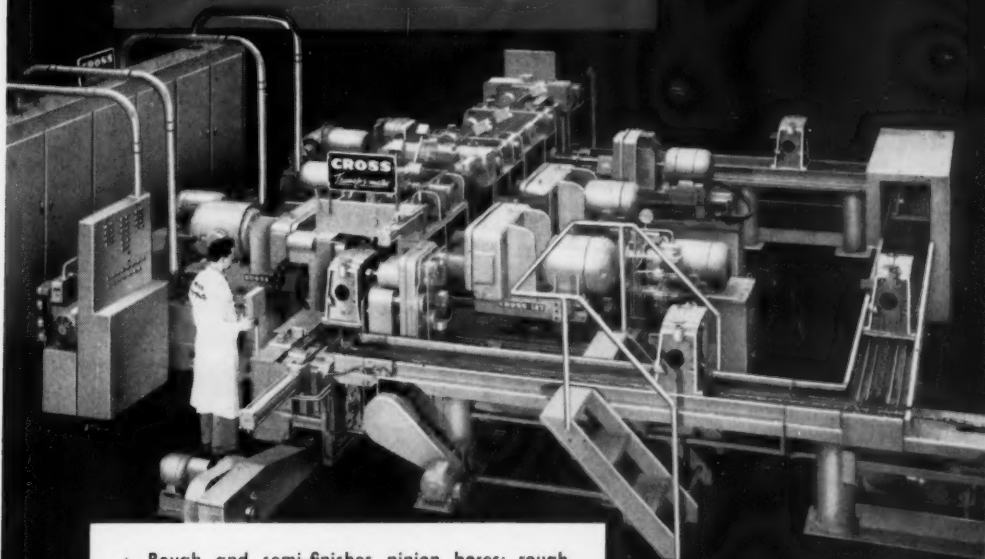
Write For New Complete Catalog

W. R. BROWN CORP., 2649 N. NORMANDY AVE., CHICAGO 35, ILL.

AIR REGULATORS • AIR VALVES • AIR FILTERS • PAINT SPRAYERS • AIR COMPRESSORS

Another Transfer-matic by Cross

Machines Rear Axle Differential Gear Housings



- ★ Rough and semi-finishes pinion bores; rough bores, semi-finish bores and taps cross bores.
- ★ 155 parts per hour at 100% efficiency.
- ★ 9 stations—1 for loading, 4 for boring, 1 for tapping, 2 for indexing, 1 for visual inspection.
- ★ Pallet-type work holding fixtures.
- ★ Hydraulic power wrench for clamping parts.
- ★ Automatic transfer of fixtures from station to station.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; tandem drive for locating pins; hydraulic feed and rapid traverse; automatic lubrication; oil-mist lubrication for taps; drag-chain type chip conveyor.



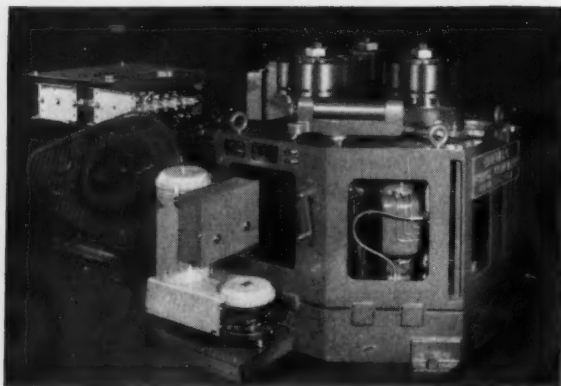
Established 1898

THE **CROSS** CO.
DETROIT 7, MICHIGAN
Special MACHINE TOOLS

YOU'RE BUYING OUTPUT

WHEN
YOU BUY *"Buffalo"*

BENDING ROLLS



For complete information on "Buffalo" Bending Rolls (OA Aircraft Type, Pinch Type, Horizontal and Vertical), write for Bulletins 352 and 3344.

- Production speed in bending arcs, circles, spirals.
- Handle angles, beams, channels, flats, rounds, squares, pipe.
- Wide variety of sizes to suit your operations.
- Little experience needed to operate.
- Your cheapest method of bending structurals.



BUFFALO FORGE COMPANY

388 BROADWAY

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd. Kitchener, Ont.

DRILLING

PUNCHING

SHEARING

BENDING

HEAVY LOAD / LIGHT WORK

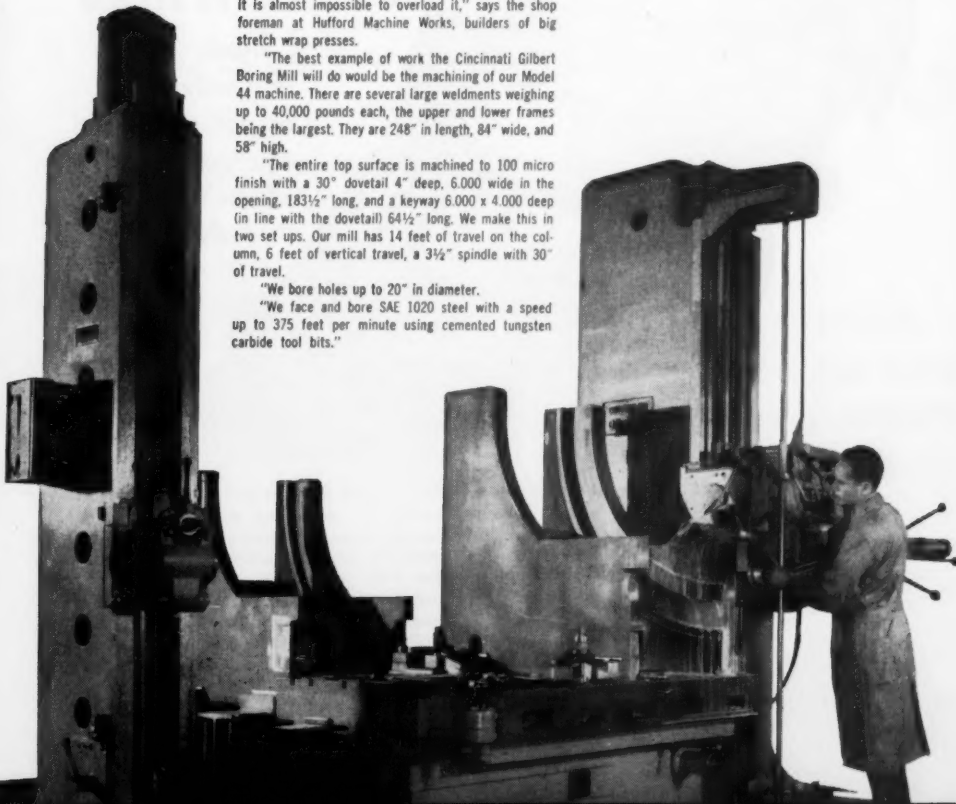
"The thing I like about the Cincinnati Gilbert is that it is almost impossible to overload it," says the shop foreman at Hufford Machine Works, builders of big stretch wrap presses.

"The best example of work the Cincinnati Gilbert Boring Mill will do would be the machining of our Model 44 machine. There are several large weldments weighing up to 40,000 pounds each, the upper and lower frames being the largest. They are 248" in length, 84" wide, and 58" high.

"The entire top surface is machined to 100 micro finish with a 30° dovetail 4" deep, 6,000 wide in the opening, 183½" long, and a keyway 6,000 x 4,000 deep (in line with the dovetail) 64½" long. We make this in two set ups. Our mill has 14 feet of travel on the column, 6 feet of vertical travel, a 3½" spindle with 30° of travel.

"We bore holes up to 20" in diameter.

"We face and bore SAE 1020 steel with a speed up to 375 feet per minute using cemented tungsten carbide tool bits."



Centralized controls, frictionless response, maximum flow of power from motor to tool make light work of heavy loads on a Gilbert. Hufford uses a floor type machine with sliding table. Many other arrangements are available. Write for literature on these versatile machines.

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



VK Set No. 20 HS Thread Measuring Wires, accurate to $\pm .000025''$ for 20 common pitch Unified and American screw threads, 6 to 36 threads per inch.

The Van Keuren Catalog and Handbook No. 35 contains 91 pages of technical and engineering information on wire measurement of screw threads. This information, compiled from many years research in the field, is available without charge by addressing: The Van Keuren Co., 175 Waltham St., Watertown, Mass.

The three-wire method is probably the best known and most widely accepted system of measuring pitch diameter of screw threads. Equipment required includes only a set of VK Thread Measuring Wires of proper diameter and an accurate measuring instrument.

Van Keuren Thread Measuring Wires have been developed over a period of many years of pioneering in the precise measurement field. They are made to National Bureau of Standards specifications, are held within $.00002''$ for roundness, straightness and identity and to within $.000025''$ of exact size.

VK Thread Measuring Wires are made of long-wearing, tough and beautifully finished high speed steel and are either $1\frac{1}{2}''$ or $2''$ in length. Every wire is subjected to the closest criteria in today's standards of accuracy.

In addition to set No. 20, shown here, VK furnishes many other standard sets as well as special wires in diameters from $.001''$ to $1.500''$.



THE *Van Keuren* co.,

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carbide Cemented Carbide Plug Gages • Carbide Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages



Delpark

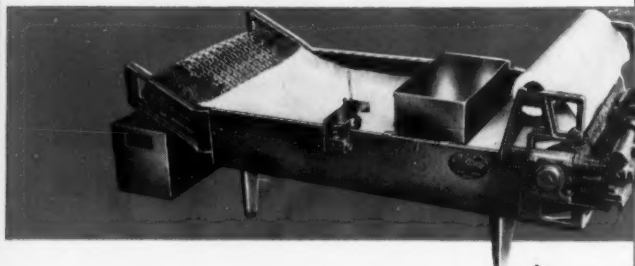
FILTERS SAVE

NEARLY

\$4,000,000*

ANNUALLY

On Grinding Operations



The savings made by DELPARK Filters in grinding operations is one of the outstanding developments in industrial cost reduction. DELPARK Filters are saving industry more money than any other production line liquid filter.

On grinding operations particularly, actual costs and savings pin point the importance of DELPARK coolant filtration in increased profits.

Today there are more than 3,000 DELPARK Filters in use in American industrial plants. Here is added proof of the wide acceptance, and recognized importance of DELPARK filtration in industry. If your applications are coolant, quench oil or any of the other industrial liquid filtration problems, DELPARK engineers can help you.

Backed by more than 40 years experience in industrial filtration problems.

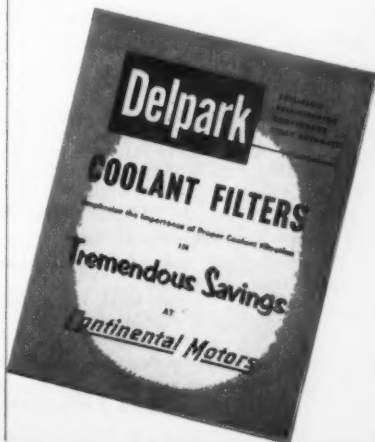
Delpark

INDUSTRIAL FILTRATION

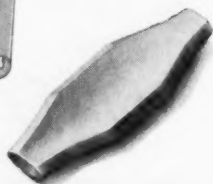
* Based on \$1754.55
per filter savings shown
in the 4-page brochure
illustrated below



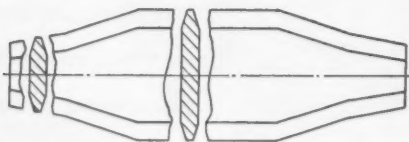
GET THE FACTS AND FIGURES ON
THIS TERRIFIC SAVINGS STORY.
WRITE FOR THIS 4-PAGE BULLETIN.



INDUSTRIAL FILTRATION COMPANY, 13 INDUSTRIAL AVENUE, LEBANON, INDIANA



*Swaging prior to forging . . .
saves materials, machining, trimming*

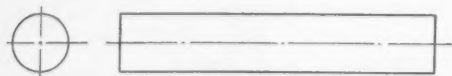


This precision-forged piece under normal procedures would have required extensive trimming and machining operations.

But Torrington's swaging experts suggested a method that saved time and material—cut finishing operations to a minimum.



A round blank was swaged to a predetermined double taper shape prior to forging. This produced a forging blank of the required uniformity that facilitated the flow of metal to the desired shape in the forging operation.



And, since the new blank was smaller than the one used before swaging, expensive material was saved.

**Swaging Advantages . . .
No Chips . . . No Waste
. . . No Scrap**

Swaging reduces metal—saves material—does not cut it away wastefully.

Swaging work hardens metal—gives it added strength, better finish and resiliency, dimensional accuracy.

Swaging is fast—can be done by unskilled workers to produce more pieces at lower cost.

Write for our informative booklet on swaging that gives detailed descriptions of Torrington Rotary Swagers. It may show you how to achieve new savings in your own plant.

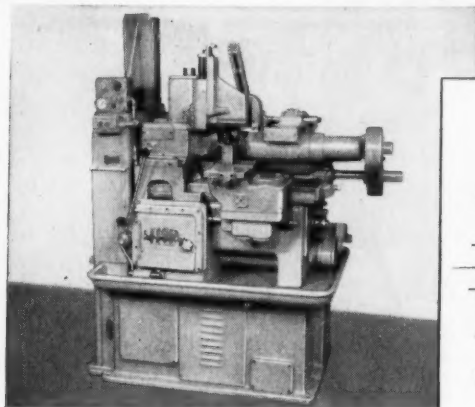


THE TORRINGTON COMPANY
Swager Department
730 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

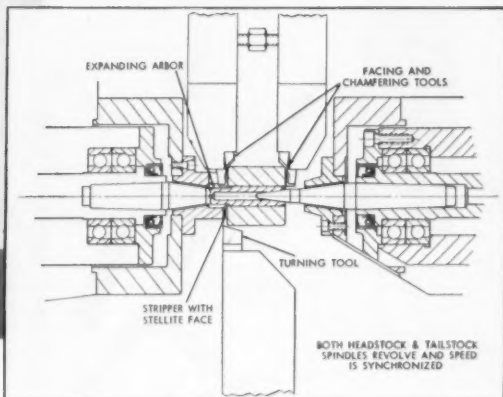
TORRINGTON ROTARY SWAGING MACHINES

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



*Automatically-loaded Lo-swing IMP Lathe
equipped for machining Oil Pump Gears*



AUTOMATICALLY LOADED *Lo-swing* **IMP LATHE** **SPEEDS PRODUCTION** **OF OIL PUMP GEARS**

PROBLEM: To automatically load, turn, face and chamfer pump gears made from powdered iron.

SOLUTION: The Lo-swing IMP Automatic Lathes selected for this job were equipped with a Rotary Type Loader which assures a constant flow of pump gears through the machine on a complete automatic cycle.

The parts arrive at the machine with the bore finished to size and with a small amount of surplus material to be removed from the faces and outside diameter.

The Lathes are equipped with revolving head and tailstock spindles, both of which are driven from a splined jackshaft. The advantage of the double end drive is two-fold. Since the piece is driven from both ends, coarser feeds may be used, and the double-end drive assures synchronization of the speed of both spindles eliminat-

ing slippage wear on the collet expander. Details of the tooling used are shown in the line drawing.

The pump gears are loaded into the chute, visible in the illustration, and are fed by gravity to the openings in the Rotary Loader which indexes the parts to the proper position. They are then picked up automatically by the revolving spindles which are withdrawn during the indexing of the Rotary Loader.

The outside diameter is turned with a carbide tool mounted on the front turning slide, while the faces of the pump gears are faced and chamfered with carbide tools mounted on the vertical slide shown in the illustration.

The Rotary Type Loader assures complete control over the fast revolving pump gears, eliminating danger to personnel and damage to parts since they are completely stationary by the time they reach the discharge chute.

Engineered jobs are our specialty. Our staff is at your disposal to assist in solving your problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

APEX *has the tools you need to drive Phillips screws*



Using Phillips screws on your fastening operations? Then you'll want to know more about Apex tools for driving Phillips screws.

Power bits, standard and magnetic bit holders and insert bits, hand drivers, service drive bits, offset drivers, hand brace bits—Apex has them all,

for all sizes of Phillips screws.

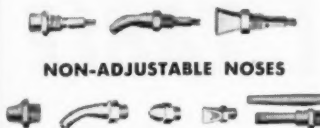
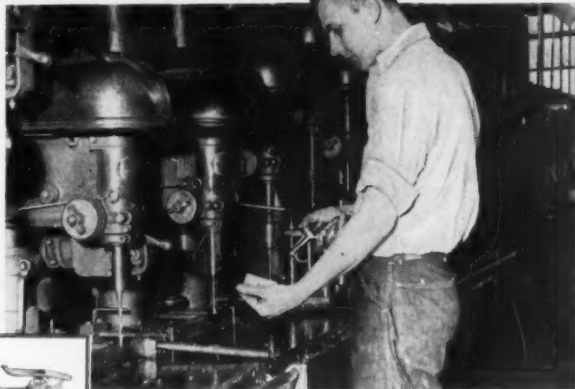
For production screwdriving, using air or electric power tools or manual methods, there's an Apex tool exactly fitted to your requirements. Catalog 21—the authority on screwdriving—can help you. Write, on your company letterhead please, for your copy.

APEX

screwdriving tools

THE APEX MACHINE & TOOL CO.
1027 Patterson Blvd. • Dayton 2, Ohio

Put air at your fingertips with a Schrader Blow Gun



Choose the Blow Gun that suits you best from the thirty-six designs and styles of Schrader Blow Guns available. The interchangeable adjustable and non-adjustable noses also available make Schrader Blow Guns the most versatile you can buy.

Schrader
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You'll find there are Schrader Blow Guns that *just suit* any operation you may have . . . reliably and economically. The #9326 Schrader Blow Gun shown here, for instance, will take the toughest treatment.

● **It's rugged**, both in design and construction. It is drop forged of stainless steel to give years of service. It has a countersunk nose and shielded operating button.

● **It's convenient** — Notice the handy hang-up hook. Hang the gun close to where you need it . . . and remember, this hook acts as a guard, to keep hands away from moving parts.

● **It's economical** — Any Schrader Blow Gun shuts off tightly the instant you lift your finger—delivers air only while it's needed.

● **Thirty-six** designs and styles of Schrader Blow Guns—drop forged stainless steel or brass . . . button type . . . lever type . . . adjustable nose . . . flexible nozzle . . . angle nozzle are available.

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Division of Scovill Manufacturing Company, Incorporated
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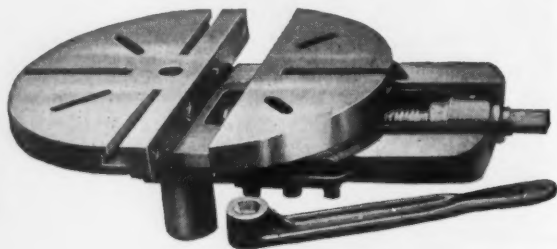
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*For Faster, SAFER Work
in Your Maintenance Department*



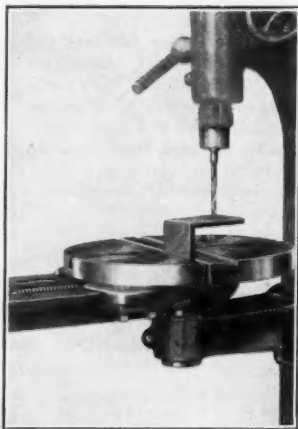
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Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minutes set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes

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Shows many typical set-ups, and use in radial drills. Complete specifications on all models. Covers **MONEY BACK GUARANTEE** and **30 DAY FREE TRIAL OFFER**.



MODERN MACHINE TOOL CO.

Jackson, Michigan

SAVE MONEY

Cut bars, rounds, and pipes
fast, accurate, and economically

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KELLER POWER HACK SAWS

10 MODELS with
Capacities $3\frac{1}{2}$ " x $3\frac{1}{2}$ " to 9" x 9"

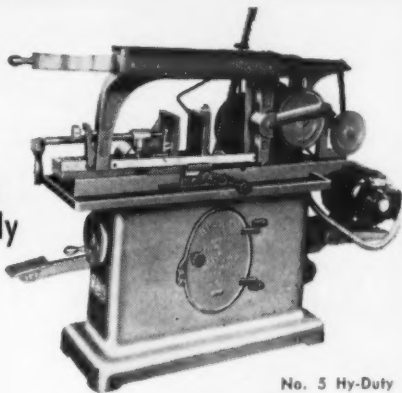
Reduce your cutting costs. Let the simple, efficient design of ten Keller Power Hack Saw models give you maximum output at a minimum investment.

More features you want from the smallest to the largest capacities to give you lower operating and maintenance costs and longer blade life.

Keller Power Hack Saws are the choice of thousands. Investigate the 10 models and you will find a Keller to meet your requirements. Write for illustrated bulletin and low prices today!

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No. 5 Hy-Duty



No. 1-HB Bench Model

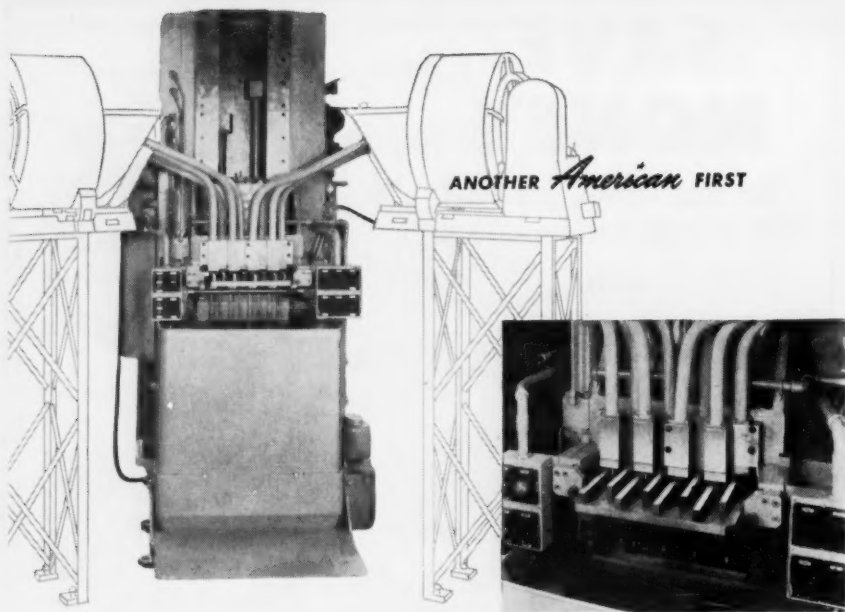


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KELLER

POWER • HACK SAWS



AUTOMATED BROACHING

1600 piston pins per hour



As a metal working process, broaching adapts easily to the new concept of automation — with new highs in productive capacity achieved in a great variety of different applications.

Here, an eight station American vertical pull-up broaching machine, equipped with hopper feeds and hydraulic positioning slide, automatically broaches the ID of automotive piston pins — eight at a time, 1600 per hour. Feed, broaching and parts ejection continue automatically once the machine cycle has been started.

Why not investigate the all-around service that American is equipped to give you on broaches, fixtures and broaching machines. Drop us a line, giving details of your machining problem — catalogs and recommendations will be furnished promptly.



American BROACH & MACHINE CO.

A DIVISION OF SUNSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

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Look at all the
**NEW
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**Flat Ground
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SIMONDS**

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STANDARD SIZES AND WEIGHTS OF STEEL RAILS

STOCK SIZES

THICKNESS	WIDTH	LENGTH	WEIGHT	STOCK NO.
1/8"	12"	36"	1.1	1001
1/8"	12"	48"	1.5	1002
1/8"	12"	60"	1.9	1003
1/8"	12"	72"	2.3	1004
1/8"	12"	84"	2.7	1005
1/8"	12"	96"	3.1	1006
1/8"	12"	108"	3.5	1007
1/8"	12"	120"	3.9	1008
1/8"	12"	132"	4.3	1009
1/8"	12"	144"	4.7	1010
1/8"	12"	156"	5.1	1011
1/8"	12"	168"	5.5	1012
1/8"	12"	180"	5.9	1013
1/8"	12"	192"	6.3	1014
1/8"	12"	204"	6.7	1015
1/8"	12"	216"	7.1	1016
1/8"	12"	228"	7.5	1017
1/8"	12"	240"	7.9	1018
1/8"	12"	252"	8.3	1019
1/8"	12"	264"	8.7	1020
1/8"	12"	276"	9.1	1021
1/8"	12"	288"	9.5	1022
1/8"	12"	300"	9.9	1023
1/8"	12"	312"	10.3	1024
1/8"	12"	324"	10.7	1025
1/8"	12"	336"	11.1	1026
1/8"	12"	348"	11.5	1027
1/8"	12"	360"	11.9	1028
1/8"	12"	372"	12.3	1029
1/8"	12"	384"	12.7	1030
1/8"	12"	396"	13.1	1031
1/8"	12"	408"	13.5	1032
1/8"	12"	420"	13.9	1033
1/8"	12"	432"	14.3	1034
1/8"	12"	444"	14.7	1035
1/8"	12"	456"	15.1	1036
1/8"	12"	468"	15.5	1037
1/8"	12"	480"	15.9	1038
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1/8"	12"	504"	16.7	1040
1/8"	12"	516"	17.1	1041
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1/8"	12"	540"	17.9	1043
1/8"	12"	552"	18.3	1044
1/8"	12"	564"	18.7	1045
1/8"	12"	576"	19.1	1046
1/8"	12"	588"	19.5	1047
1/8"	12"	600"	19.9	1048
1/8"	12"	612"	20.3	1049
1/8"	12"	624"	20.7	1050
1/8"	12"	636"	21.1	1051
1/8"	12"	648"	21.5	1052
1/8"	12"	660"	21.9	1053
1/8"	12"	672"	22.3	1054
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1/8"	12"	708"	23.5	1057
1/8"	12"	720"	23.9	1058
1/8"	12"	732"	24.3	1059
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1/8"	12"	780"	25.9	1063
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1/8"	12"	1260"	41.9	1103
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1/8"	12"	1284"	42.7	1105
1/8"	12"	1296"	43.1	1106
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1/8"	12"	1332"	44.3	1109
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1/8"	12"	1584"	52.7	1130
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1/8"	12"	1704"	56.7	1140
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1/8"	12"	1800"	59.9	1148
1/8"	12"	1812"	60.3	1149
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1/8"	12"	1872"	62.3	1154
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1/8"	12"	1920"	63.9	1158
1/8"	12"	1932"	64.3	1159
1/8"	12"	1944"	64.7	1160
1/8"	12"	1956"	65.1	1161
1/8"	12"	1968"	65.5	1162
1/8"	12"	1980"	65.9	1163
1/8"	12"	1992"	66.3	1164
1/8"	12"	2004"	66.7	1165
1/8"	12"	2016"	67.1	1166
1/8"	12"	2028"	67.5	1167
1/8"	12"	2040"	67.9	1168
1/8"	12"	2052"	68.3	1169
1/8"	12"	2064"	68.7	1170
1/8"	12"	2076"	69.1	1171
1/8"	12"	2088"	69.5	1172
1/8"	12"	2100"	69.9	1173
1/8"	12"	2112"	70.3	1174
1/8"	12"	2124"	70.7	1175
1/8"	12"	2136"	71.1	1176
1/8"	12"	2148"	71.5	1177
1/8"	12"	2160"	71.9	1178
1/8"	12"	2172"	72.3	1179
1/8"	12"	2184"	72.7	1180
1/8"	12"	2196"	73.1	1181
1/8"	12"	2208"	73.5	1182
1/8"	12"	2220"	73.9	1183
1/8"	12"	2232"	74.3	1184
1/8"	12"	2244"	74.7	1185
1/8"	12"	2256"	75.1	1186
1/8"	12"	2268"	75.5	1187
1/8"	12"	2280"	75.9	1188
1/8"	12"	2292"	76.3	1189
1/8"	12"	2304"	76.7	1190
1/8"	12"	2316"	77.1	1191
1/8"	12"	2328"	77.5	1192
1/8"	12"	2340"	77.9	1193
1/8"	12"	2352"	78.3	1194
1/8"	12"	2364"	78.7	1195
1/8"	12"	2376"	79.1	1196
1/8"	12"	2388"	79.5	1197
1/8"	12"	2400"	79.9	1198
1/8"	12"	2412"	80.3	1199
1/8"	12"	2424"	80.7	1200
1/8"	12"	2436"	81.1	1201
1/8"	12"	2448"	81.5	1202
1/8"	12"	2460"	81.9	1203
1/8"	12"	2472"	82.3	1204
1/8"	12"	2484"	82.7	1205
1/8"	12"	2496"	83.1	1206
1/8"	12"	2508"	83.5	1207
1/8"	12"	2520"	83.9	1208
1/8"	12"	2532"	84.3	1209
1/8"	12"	2544"	84.7	1210
1/8"	12"	2556"	85.1	1211
1/8"	12"	2568"	85.5	1212
1/8"	12"	2580"	85.9	1213
1/8"	12"	2592"	86.3	1214
1/8"	12"	2604"	86.7	1215
1/8"	12"	2616"	87.1	1216
1/8"	12"	2628"	87.5	1217
1/8"	12"	2640"	87.9	1218
1/8"	12"	2652"	88.3	1219
1/8"	12"	2664"	88.7	1220
1/8"	12"	2676"	89.1	1221
1/8"	12"	2688"	89.5	1222
1/8"	12"	2700"	89.9	1223
1/8"	12"	2712"	90.3	1224
1/8"	12"	2724"	90.7	1225
1/8"	12"	2736"	91.1	1226
1/8"	12"	2748"	91.5	1227
1/8"	12"	2760"	91.9	1228
1/8"	12"	2772"	92.3	1229
1/8"	12"	2784"	92.7	1230
1/8"	12"	2796"	93.1	1231
1/8"	12"	2808"	93.5	1232
1/8"	12"	2820"	93.9	1233
1/8"	12"	2832"	94.3	1234
1/8"	12"	2844"	94.7	1235
1/8"	12"	2856"	95.1	1236
1/8"	12"	2868"	95.5	1237
1/8"	12"	2880"	95.9	1238
1/8"	12"	2892"	96.3	1239
1/8"	12"	2904"	96.7	1240
1/8"	12"	2916"	97.1	1241
1/8"	12"	2928"	97.5	1242
1/8"	12"	2940"	97.9	1243
1/8"	12"	2952"	98.3	1244
1/8"	12"	2964"	98.7	1245
1/8"	12"	2976"	99.1	1246
1/8"	12"	2988"	99.5	1247
1/8"	12"	3000"	99.9	1248
1/8"	12"	3012"	100.3	1249
1/8"	12"	3024"	100.7	1250
1/8"	12"	3036"	101.1	1251
1/8"	12"	3048"	101.5	1252
1/8"	12"	3060"	101.9	1253
1/8"	12"	3072"	102.3	1254
1/8"	12"	3084"	102.7	1255
1/8"	12"	3096"	103.1	1256
1/8"	12"	3108"	103.5	1257
1/8"	12"	3120"	103.9	1258
1/8"	12"	3132"	104.3	1259
1/8"	1			

1 *Kling*

HIGH-SPEED FRICTION SAWS cut time for cutting practically all steel shapes.

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and POPE PLATE BENDING ROLLS provide largest selection on the market.

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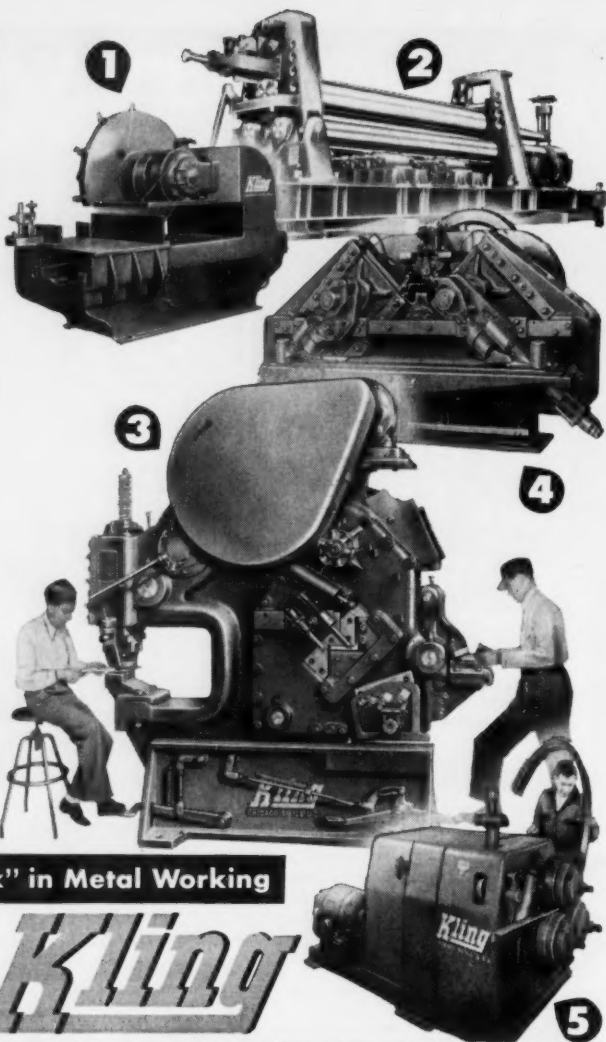
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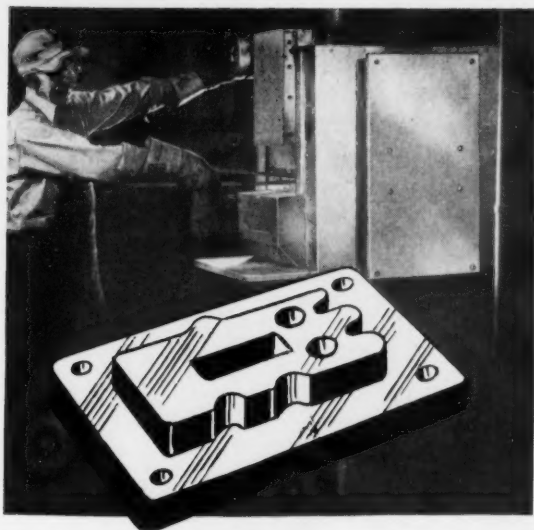
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Export Distributors: Simmons Machine Tool Corp., 50 E. 42nd St., N. Y. 17, N. Y.



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Cincinnati Sub-Zero Products

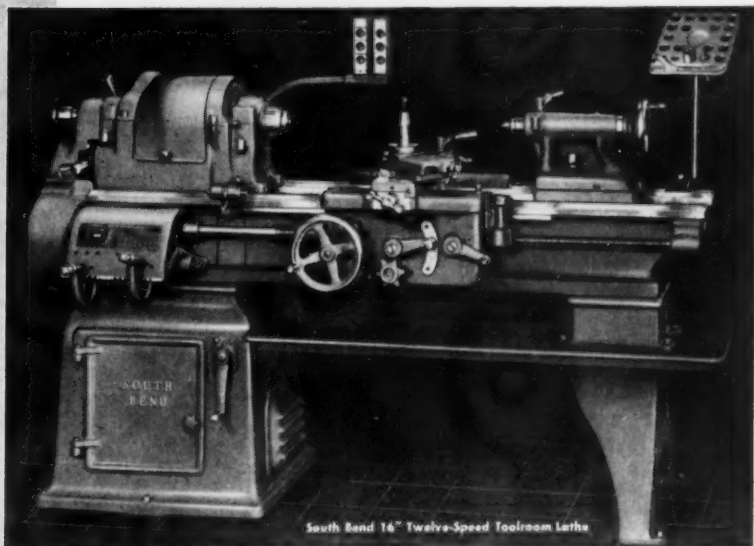
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Cincinnati 29, Ohio**

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The wide range of spindle speeds on this new lathe cuts machining time because the operator quickly selects the right speed for each operation. Pushbutton control provides a fast change from any high speed to the corresponding low speed. This versatility is further increased by 48 choices of longitud-

SOUTH BEND 12 SPEED LATHE

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South Bend 14" Twelve-Speed Toolroom Lathe

SPECIFICATIONS

Spindle Speeds (approx.) Direct: high range 300, 550, 945; low range 150, 278, 475. Back gear drive: high range 32, 70, 118; low range 20, 33, 60. Spindle Bore — 1 3/8". Swing over bed and saddle wings — 16 1/4". Swing over saddle cross slide — 9 5/8".

Distance between centers — 33 1/4", 45 1/4", 57 1/4", 81 1/4", 105 1/4". Collet Capacity — 1" maximum. Longitudinal Feeds — 48 R.H. or L.H., .0015" to .0841". Cross Feeds — 48, .0006" to .0315". Thread Pitches — 48, 4 to 224 per inch.

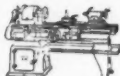
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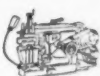
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☐ 1/2" and 1" Collet TURRET LATHES



☐ 14" DRILL PRESSES



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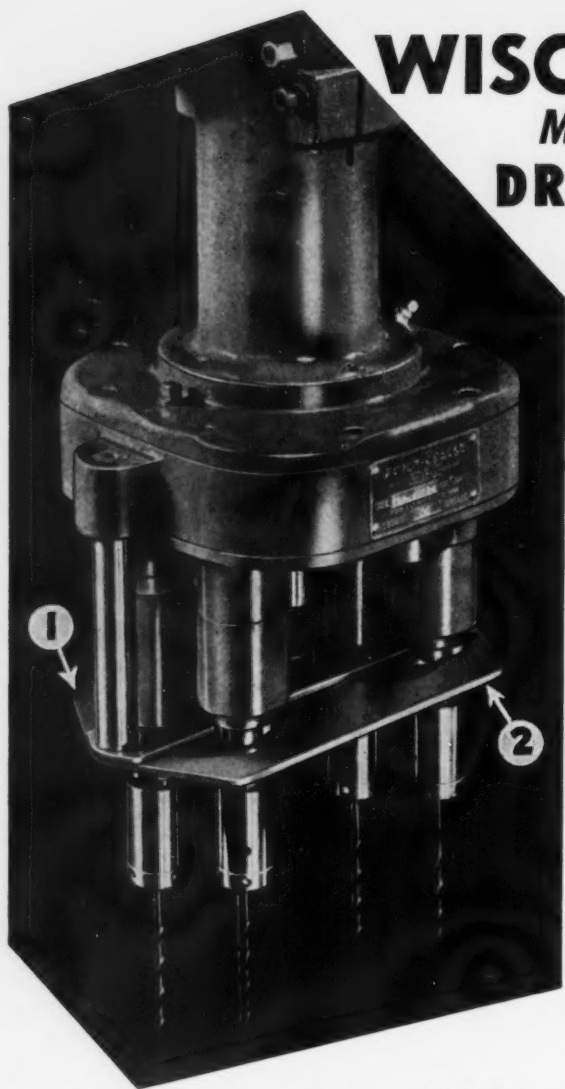
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Multiple DRILL HEADS

Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

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6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

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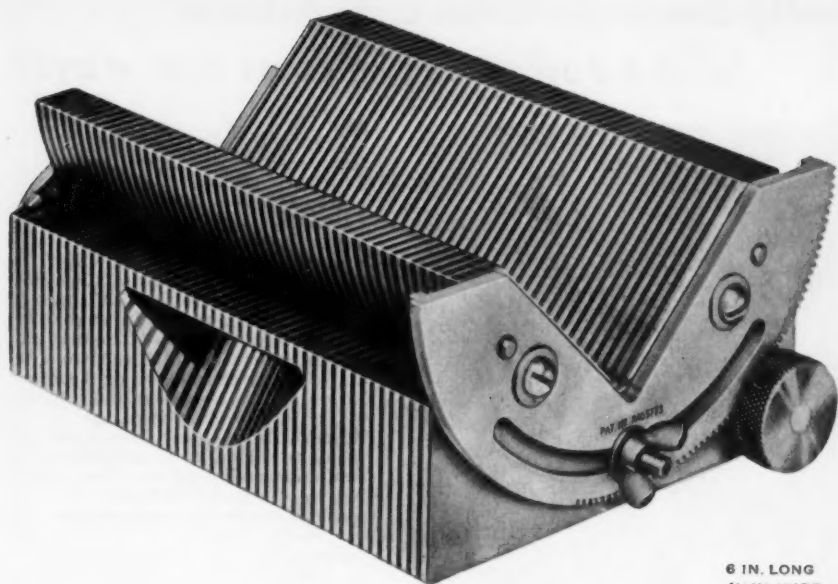
2. Locking Plate has full holes to hold spindles in place.

Send print of Hole Pattern for estimate.

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A 5942-1P



6 IN. LONG
4 1/2 IN. WIDE
2 1/2 IN. HIGH

PRECISION Adjustable Magnetic V-Block

For the first time, you can equip your shop or laboratory with a *precision* Magnetic Adjustable V-Block. This instrument permits your development of profitable new work of close tolerance nature previously impossible with available equipment. In addition, the Anton Magnetic Adjustable V-Block will reduce time and cost in your present grinding operations.

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Anton Machine Works

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For fast, accurate milling at lower cost, it pays to use Scully-Jones *precision built* Arbors!

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SCULLY-JONES

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as low as
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(Motor and all
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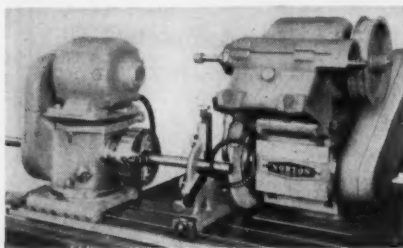
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PEDRICK TOOL & MACHINE CO.

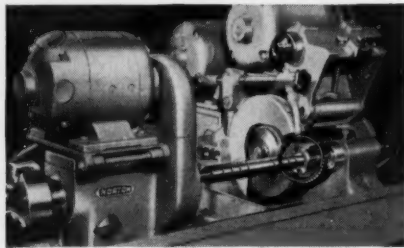
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He can change-over fast from this internal grinding set-up on the Norton 10" x 20" Universal grinder. The internal grinding spindle, permanently hinged to front of wheel side, swings up out of the way — and he's ready for external, face or angular wheel slide jobs.



Hollow spindle in headstock allows work up to 1" diameter and longer than machine to be passed clear through.



Dead center grinding — note chuck mounted at opposite end of head, a real set-up time saver.

**Quicker
set-ups
here**

*increase
your profit margin*
on many different grinding jobs

*Norton 10" x 20" and 10" x 24" Universal Grinding Machines
are famous for versatility, accuracy and fast, smooth performance*

Do you want to save valuable time on many grinding jobs? Want a multi-purpose machine for rough cuts or finest precision finishing?

Then you want the Norton 10" x 20" or 10" x 24" Universal Grinder . . . that helps you produce more work at less cost.

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Head and footstock are interchangeable, permitting simplified set-up on jobs involving shoulders or spacers, especially an angular grinds. Set-ups are made easier on chucking jobs by the D1-3" camlock nose on one end of the headstock spindle, and the provision for permanent chuck mounting. The headstock is easily swivelled 180° to change from dead center to chucking work.

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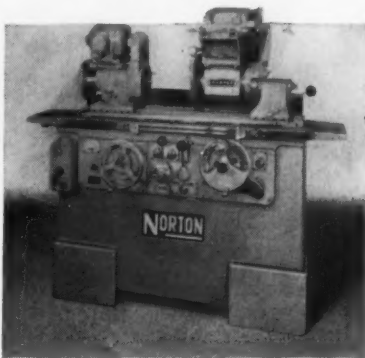
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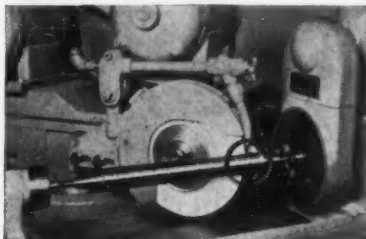
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January, 1955



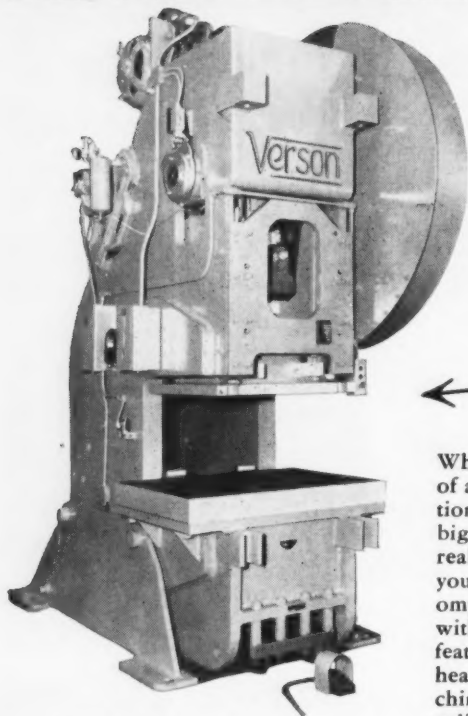
Norton 10" x 20" Universal Grinding Machine. Wheel head swivels 360°. Internal spindle hinged to front of slide and swings up out of way when grinding external work.



Head and footstock are reversible. No need to change wheel and drive to the other end of spindle.

MODERN MACHINE SHOP 37

You get **BIG** press standards
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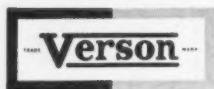
Write for your copy of the new
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It's just off the press.

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O. B. I.'s

When you can combine the versatility of an O.B.I. press with the construction and performance standards of big, expensive machines, you get a real production tool that will give you the best possible long term economy . . . And that's just what you get with Verson O.B.I.'s. Just check these features—gears running in oil . . . heavy all-steel welded frame . . . machine cut steel gear and pinion . . . split cap main and crankpin bearings . . . mechanically interlocked pneumatic clutch and brake unit . . . full electric controls . . . many others.



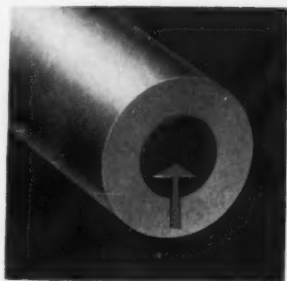
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BIG SAVINGS

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Finish Bore

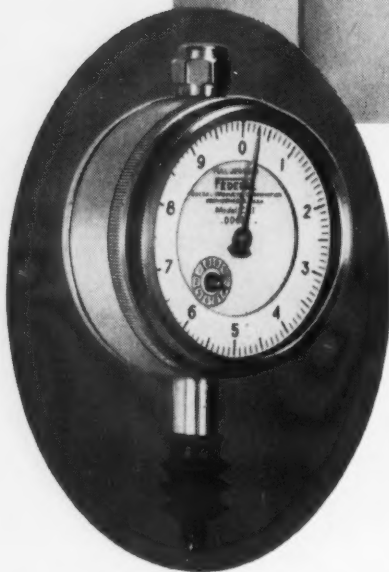
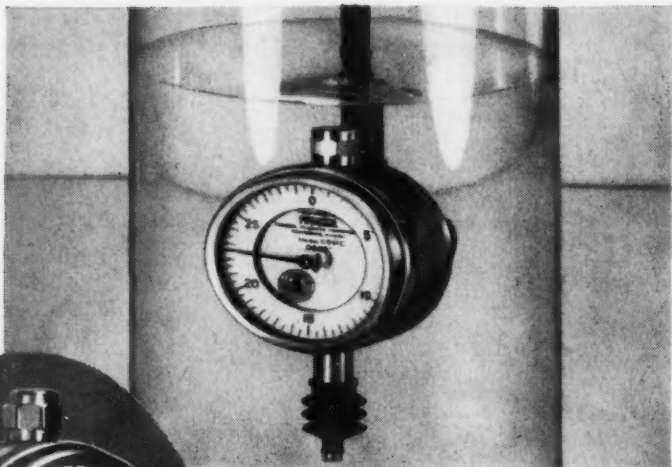


Rough and Finish Turn

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Use this Wetproof Dial Indicator wherever conditions are wet. It will give excellent performance and greatly cut maintenance costs.

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**Completely Sealed — Wholly Protected
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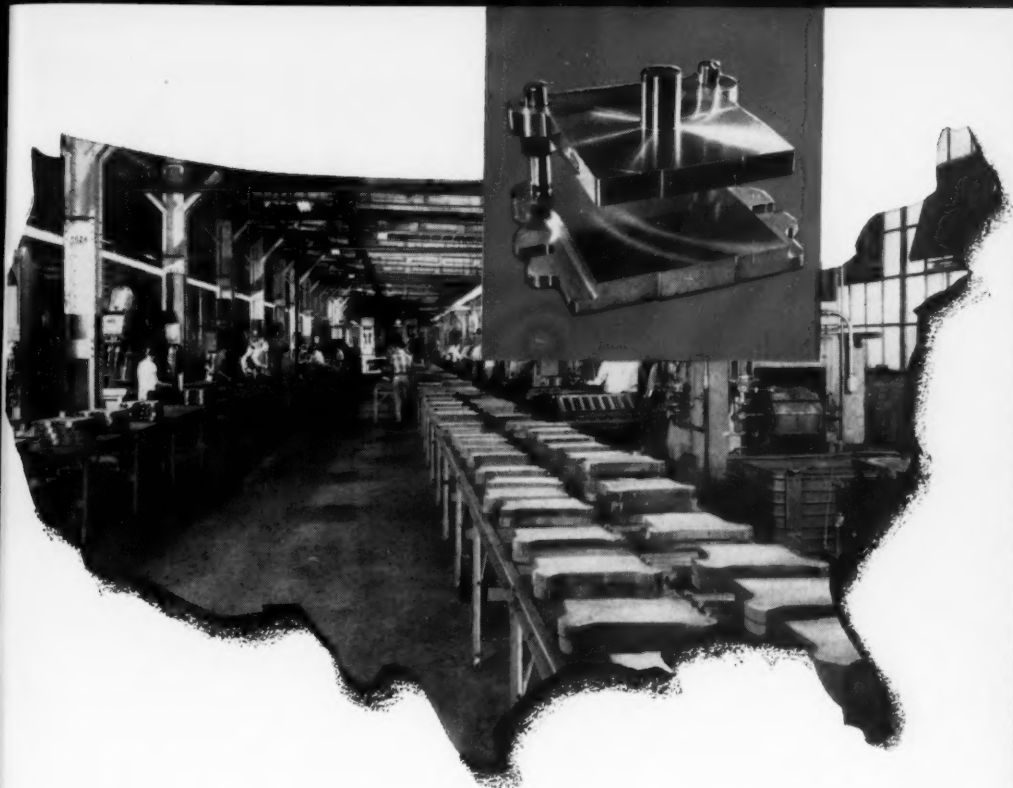
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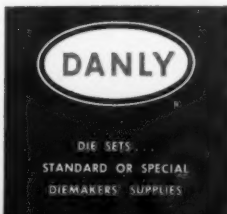
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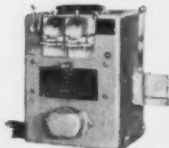
2100 South Laramie Avenue, Chicago 50, Ill.



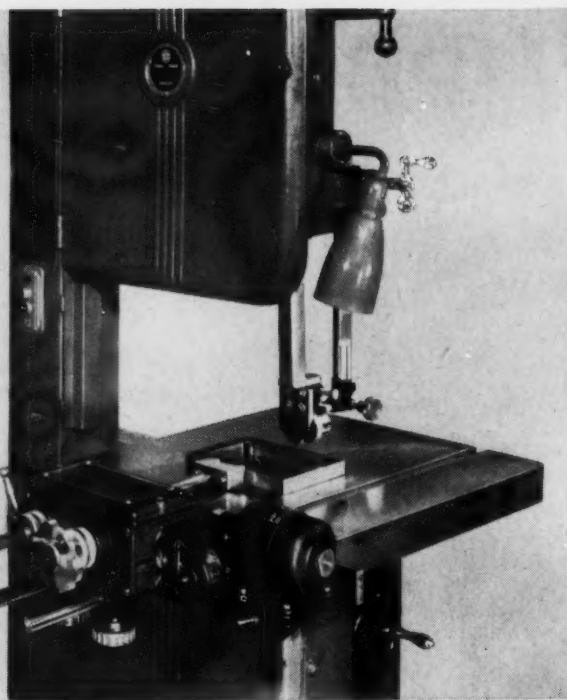
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him expert on all industrial equipment and a specialist on **LIGHT-HEAVYWEIGHTS**—a good man to know. He is as near as your phone: just look under "**TOOLS**" in the yellow pages of your local Telephone Directory. Call him today for the helpful information he has to offer.

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Eliminate Costly,
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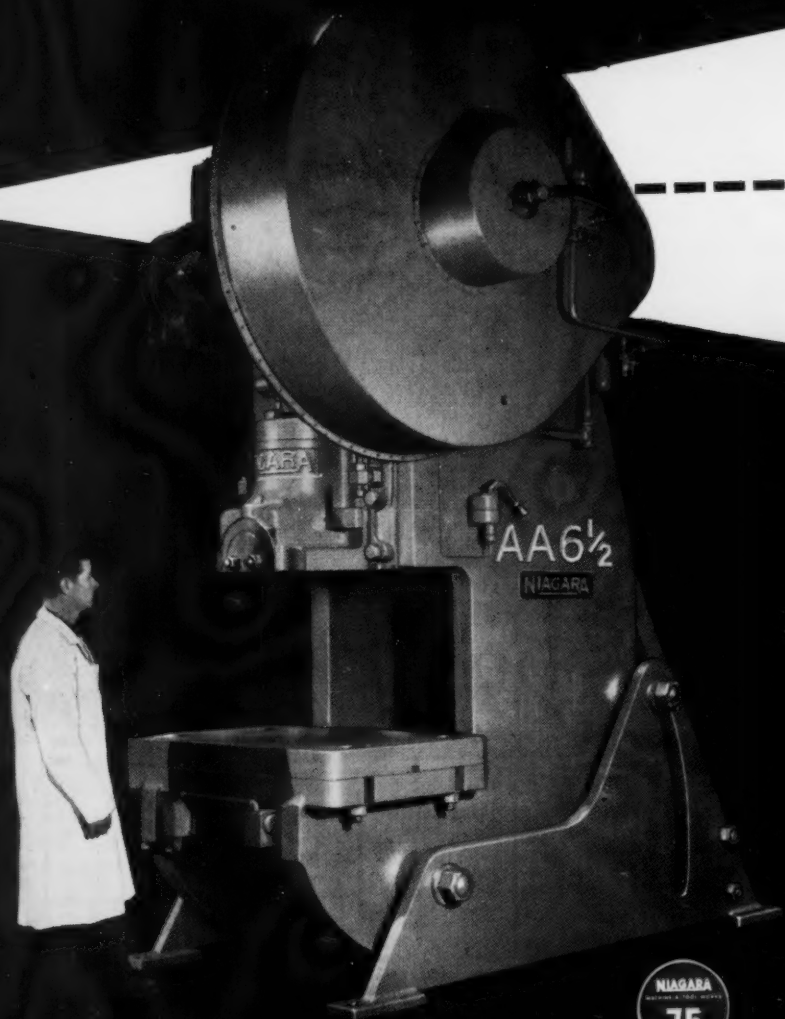
Hexnose — Plunger end is hexagonal shaped. Can be easily and quickly installed, adjusted, or removed with an ordinary end wrench! End pressures available from 8# to 12# in Standard type, and from 2½# to 6# in Silvernose type; various diameters and lengths.



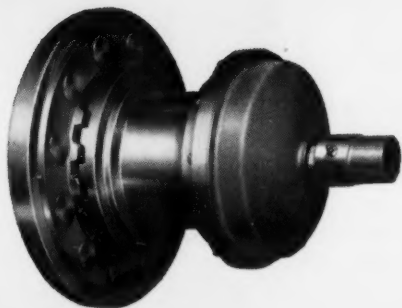
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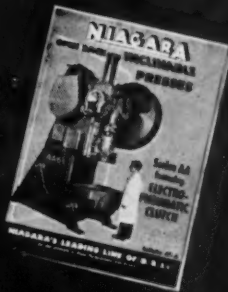
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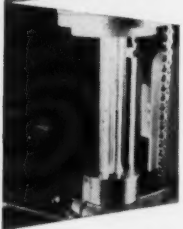
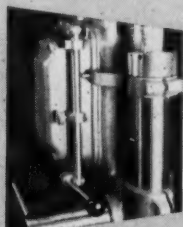
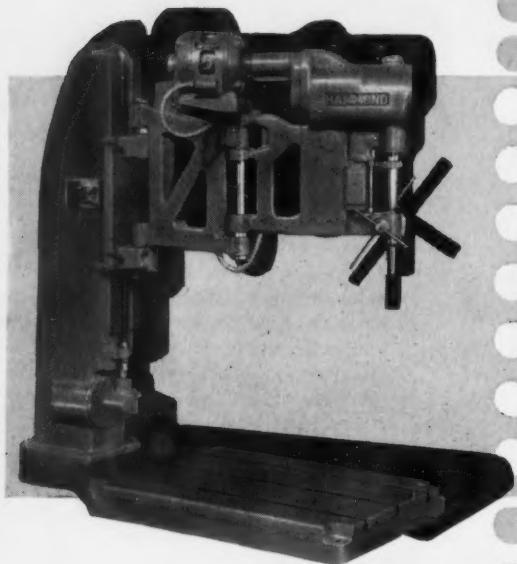
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**COMPLETE STOCKS OF DAVIS BLANK-BAR FLYCUTTERS
LET YOU TOOL UP FASTER BY MACHINING ANY SHANK
OR PILOT STYLE DESIRED RIGHT IN YOUR OWN SHOP**

Now at Davis you can choose from 11 different Super Micrometer-Adjustable Flycutter Tools—4 with 18 inches of blank bar on each side of the cutter, and 7 with unfinished shanks—and save a lot of tooling time and money by machining the bar sections to your own requirements.

Cutter adjustments to within 0.0001" are obtained by merely turning the dial of the simple, sturdy Davis micrometer mechanism. Both heavy roughing cuts and fine finishing cuts can be made with these versatile, precision tools.

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Davis Stub Boring Tools with Unfinished Shanks handle a range of bores from 1 1/4" to 7" diameter. Overall length runs from 12" to 19". Diameter and length of the unfinished portion provide ample stock for machining a shank exactly to fit your particular type and size of vertical boring mill, horizontal boring machine, engine or turret lathe, or radial drilling machine.

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BORING TOOL DIVISION OF
Giddings & Lewis Machine Tool Company
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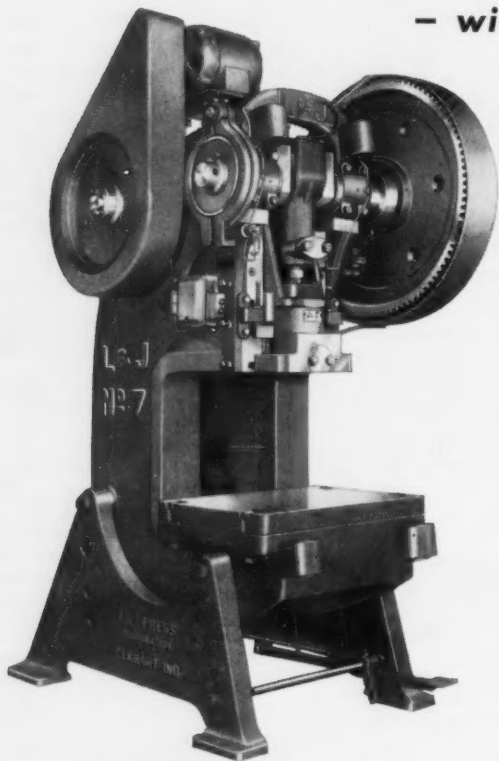
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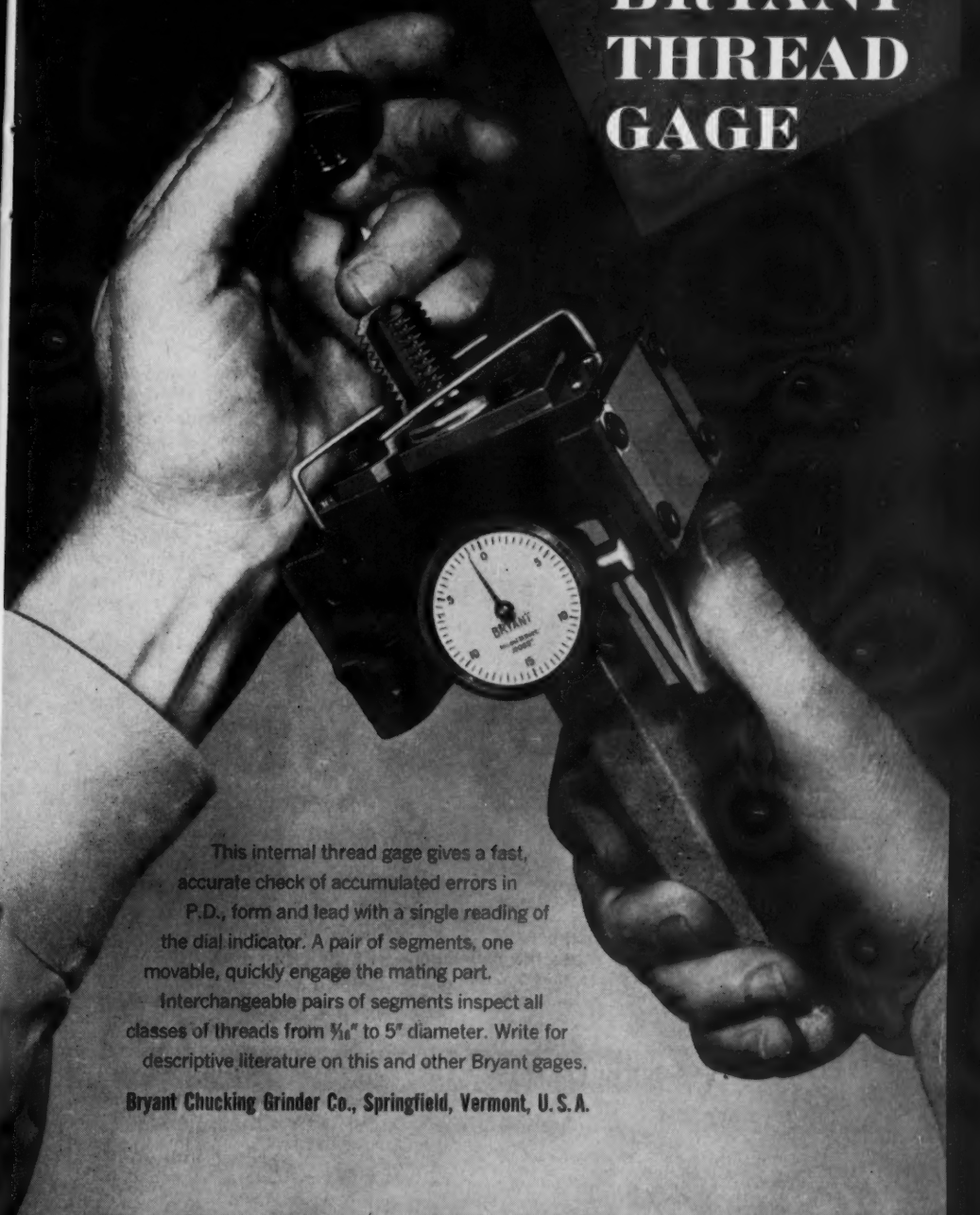
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21 O.B.I. models — 8 to 90 tons



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Here's a NEW design feature in Vertical Mills!



VERTICALLY ADJUSTED HEAD GIVES GREATER RIGIDITY AND ACCURACY

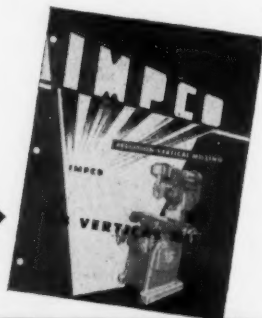
Here are the facts . . .

Unlike knee-type mills, the head of the IMPCo Model 1-B Vertical Milling Machine is vertically adjusted by a counter-balanced ram. The table and controls do NOT move vertically. The exclusive ram design has greater rigidity. Its larger scraped bearing surface area gives more accuracy for both production and tool room milling.

Massive Design for Versatility and Precision

The IMPCo Model 1-B is heavy for a No. 1 Mill. It weighs approximately 3,100 lbs. Spindle quill diameter is 3 1/2". Uses standard 1 HP motor.

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IMPCO

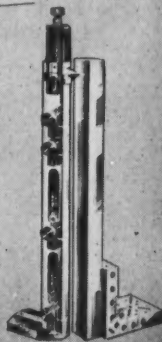
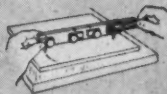
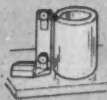
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A COMPLETE GAGING SYSTEM



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gages, thus making them especially valuable for layout or inspection work. When assembled with the required number of six inch blocks, any desired length can be obtained.

- 84 Block H.D. Set—accuracy, $\pm .000004$ ", complete with accessories.
As illustrated **\$575.00**
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The New **COVEL** NO. 10

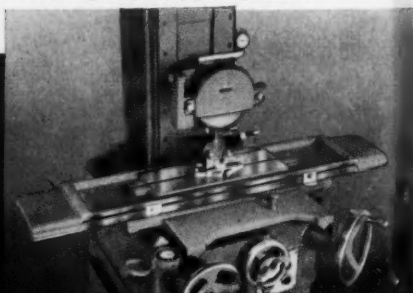
LOW COST POWER AND HAND FEED SURFACE GRINDER

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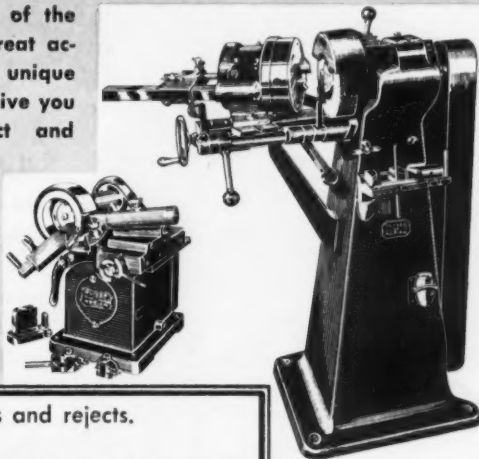
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Twist drills machine-ground the Oliver Way not only last up to 3 times longer than hand-ground drills but also cut faster and more accurately.

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An outstanding value in price and performance! The Excel No. 6 Universal Cutter and Tool Grinder will accurately sharpen reamers and milling cutters in a wide variety of shapes and sizes. A full line of attachments is available for a multitude of applications including cylindrical and internal grinding. Base optional.

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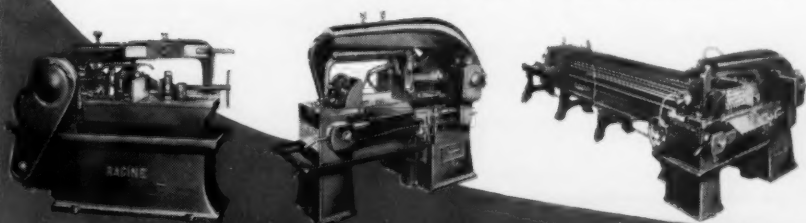


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Savings in your metal cutting will help offset ever-mounting tax, labor and material cost. Late model RACINE Power Saws hit costs at the first stage in every metal working job — where the bar or billet is cut to size. All capacities — 6" x 6" to 20" x 20", Single purpose or fully automatic bar feed units.

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10" x 10", 12" x 12" AND
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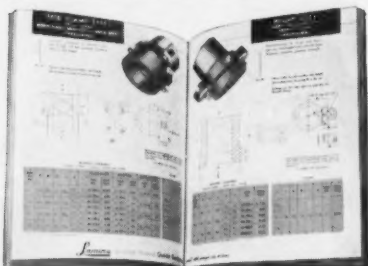
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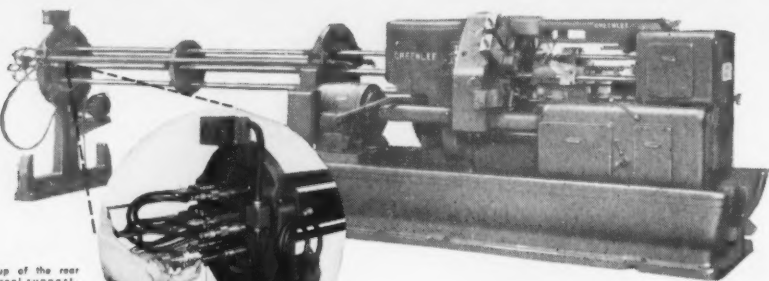
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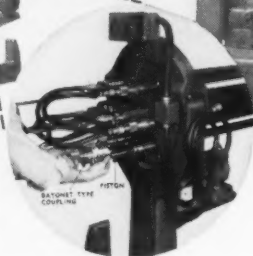
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SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

GREENLEE

Automatics



Close-up of the rear stock reel support, showing a piston (which follows and pushes the stock) being inserted in a stock tube. The air hoses are equipped with speed couplers.



This method of feeding out stock was developed primarily for the many screw machine jobs that require either multiple feed-out arrangements, greater feed-out length than the conventional mechanical arrangement will permit, or for machining parts made from ground stock where pusher marks would be objectionable. It can be adapted to all 1" and 1½" GREENLEE Automatics.

AIR-FEED (PNEUMATIC STOCK FEED)

FEEDS OUT STOCK TO 16½"

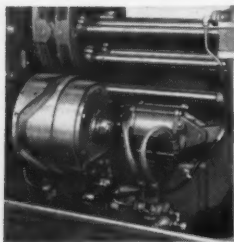
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ELIMINATES STOCK SCORING

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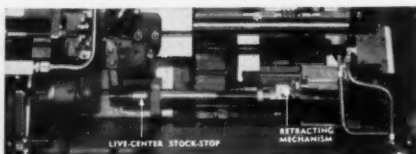
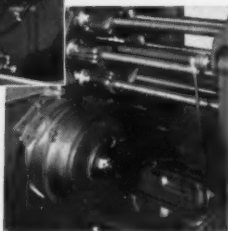
ELIMINATES STOCK PUSHERS

ELIMINATES FEED-OUT CAMS



Left: One method of opening and closing the collets for multiple feed-out. The air cylinder, controlled by a plate cam on the cam drum, actuates the collet-operating rings. Various arrangements can be made, depending on the requirements of the particular job being set up.

Right: Simplification of the feed cam drum possible with air feed, where the collets are to be opened by the conventional mechanical arrangement between the 6th and 1st positions. Feed-out is usually against a standard fixed stock stop in such cases.



Above: A method used for feeding out stock during the machining cycle. The stock is fed out against an adjustable live-center stock-stop arrangement. When the collet jaws are closed, the live-center retracts and permits the stock to rotate freely and index to the next position.

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When hand stoning tools, dies and parts, these Oilstone Files assure fast, easy, close tolerance cuts no matter how intricate the surface. **INDIA** for regular work, **HARD ARKANSAS** for superfine finishes. Available in 35 shapes and 97 sizes.

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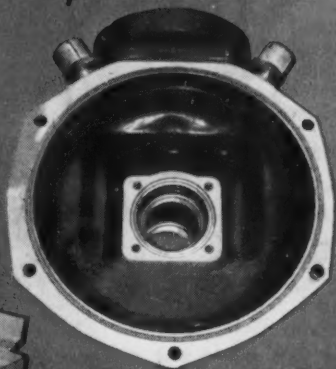
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Grinds holes plus 0.0003", minus 0.0000"

on RIVETT



Magneto Bearing Support. Bearing size is 1.5749" dia. Tolerance is plus 0.0003", minus 0.0000".

Rivett Model 1024 Internal and Universal Grinder. Double-end wheelhead swivels 180° for quick conversion.

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Pan Am states: "The Rivett Grinder is in operation during two eight-hour shifts per day, five days per week. The only service has been lubrication and replacement belts. It is considered the most accurate and productive universal grinder in the shop. We have another machine on order."

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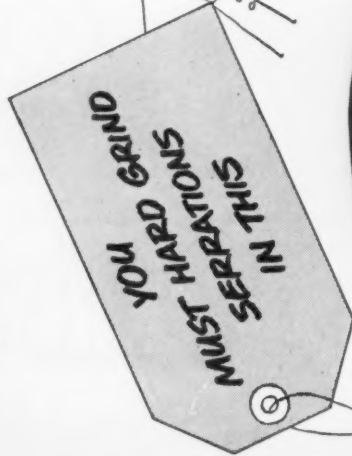
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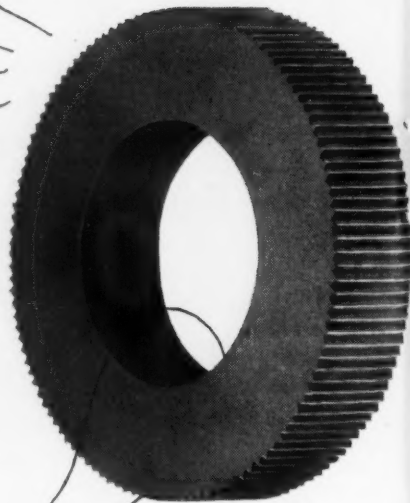
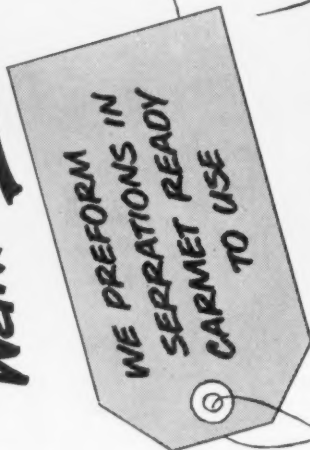
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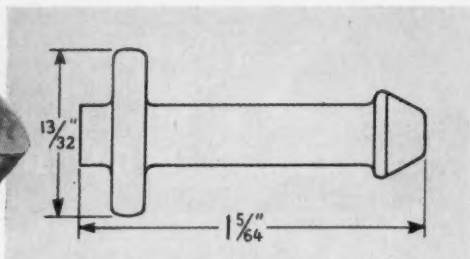
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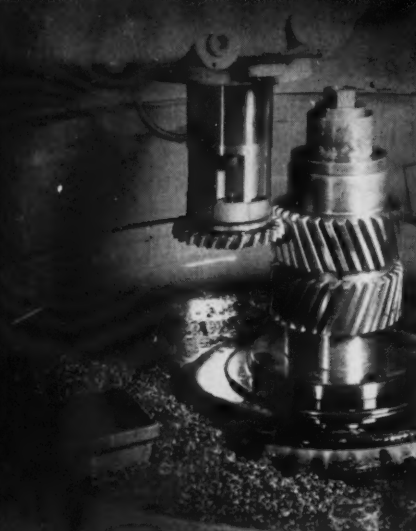
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7" spur, 6 1/2" hel.	7" spur, 7" hel.	12 inches	18 inches	36 inches	120 inches
6 spur, 6/8 hel.	5/7 spur, 6 hel.	3/4 spur, 5/7 hel.	3/4 spur, 5/7 hel.	3 spur, 4/5 hel.	2 spur, 4 hel.
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*Max. P. D. internal - 5 1/2"

				
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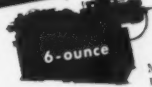
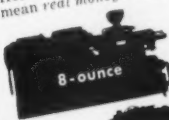
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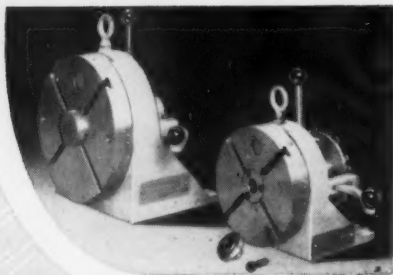
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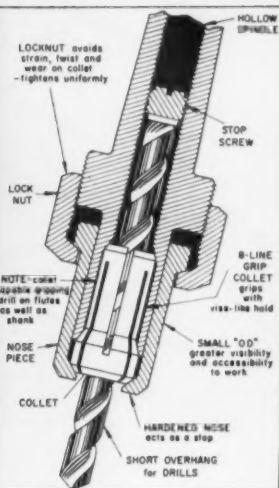
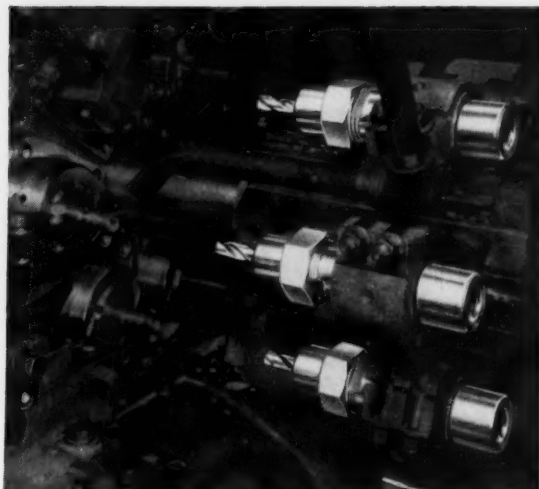
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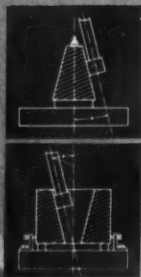
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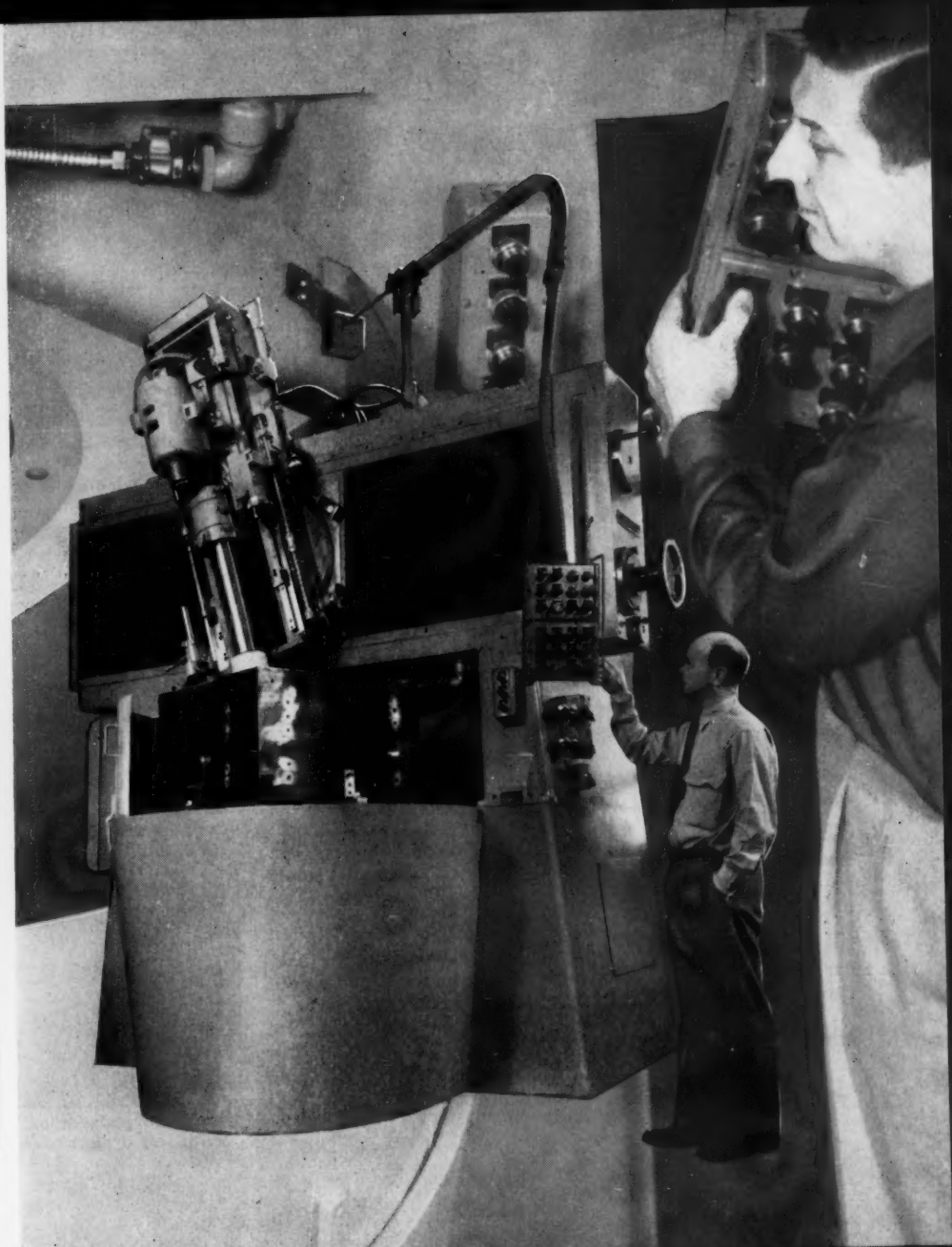
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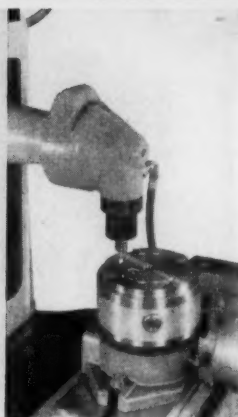
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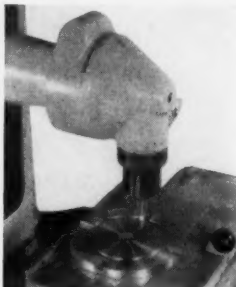
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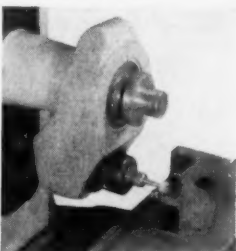
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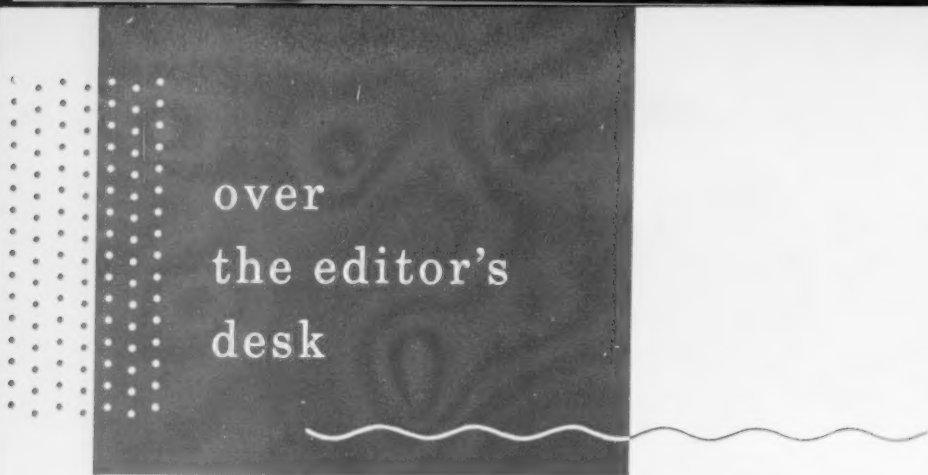
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over the editor's desk

More Leisure, Better Jobs

THE mail recently brought to our attention some interesting predictions made by Milton O. Cross, Jr., president of The Cross Company, in a paper presented before a joint session of the Machine and Production Engineering Divisions of the American Mechanical Engineers in New York City. Mr. Cross foresees more predictable and stable employment as a result of "automation" in factories of the future. A broad upgrading of labor will occur, under which the unskilled will become highly trained maintenance men, while present-day skilled tradesmen will be transformed into technicians, according to Mr. Cross. He added that labor will be considered a capital investment of business, rather than a current cost. Increased machine capacity will reduce human drudgery and working hours to provide more leisure time.

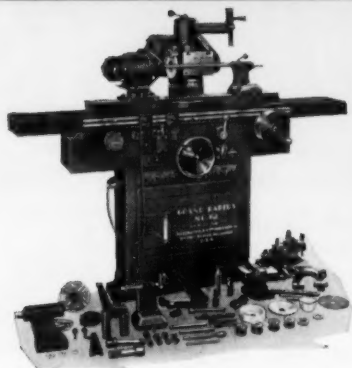
The paper described the history of the transfer machine as "the most exciting tool development of the past twenty years." Mr. Cross reviewed development of the transfer machine from the comparatively simple ones built during the thirties to the huge ones of today, such as the 350-foot long Transfer-matic recently

designed and built by his company to perform 555 operations on cylinder blocks for a large automobile manufacturer. He traced the solutions of problems encountered in the design and operation of such machines, and recent developments in production programming that hold down time for tool changes to as little as 5 per cent total production time, regardless of how many hundreds of tools might be used in one machine. He went on to say that dull tools will soon be replaced automatically, without shutting down production at all.

Advances in automation and additional integration are leading to automatic sub-assembly of various component parts and will soon make possible completely automatic final assembly, eliminating one of the last frontiers where production bottlenecks are encountered, according to Mr. Cross. A new management type is needed for the factory of the future, he added. The manager must base his actions on carefully selected objectives and long range decisions, yet have the ability to adapt his processes to new circumstances while maintaining a going business. Successful management under the new technology must create mass purchasing power and mass purchasing habits.

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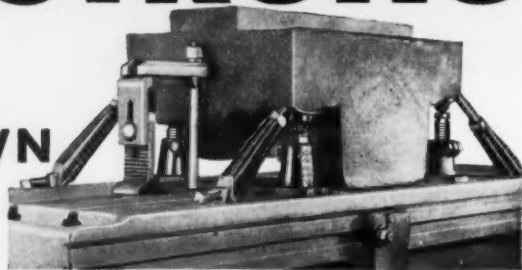
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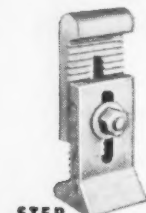
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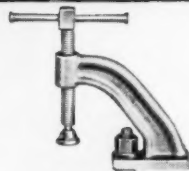
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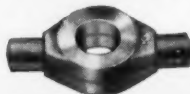
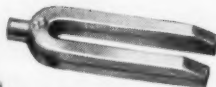
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MODERN Machine Shop

Vol. 27, No. 8
JANUARY, 1955

features
in this issue

High Production Applications of Resistance Welding

By C. D. Shultheis

This article traces the steadily increasing use of resistance welding as a production tool, together with its impact on the high production of ranges, dryers and washers. Page 84.

Essentials in Good Gage Practice, Part I

By C. W. Kennedy

The author covers certain phases of gage practice and construction of particular value to those whose job it is to consider, select, help to design, purchase or use special purpose gage equipment. Page 100.

Machining Stainless Steel

By G. J. Stevens

This case history shows how premature drill failure was overcome in a center drilling operation performed on a small shaft made of Type 303 stainless steel. Page 110.

Streamlining the Accident Prevention Program

By Alfred M. Cooper

Possible revisions in accident-prevention activity in certain industrial plants are discussed in this article. Page 116.

How Good Is Your Production Control?

By Charles A. Koepke

In this presentation, the author points out that efficient production demands periodic evaluation of the area of responsibility assigned to production control personnel. Page 138.

Drilling Cross Holes in Shafts

By F. E. Riley

This article deals primarily with a description of a cross-hole drilling jig which can be used for drilling 14 different hole diameters in shafts ranging from $\frac{3}{8}$ to 2 inches in diameter. Page 148.

Three-Dimensional Milling Setup Speeds Tool Job

By Gilbert C. Close

The author explains how a perfect semi-sphere is produced from a large steel billet with three-dimensional milling techniques. Page 154.

High Production Applications of Resistance Welding*

By C. D. SHULTHEIS**

The steadily increasing use of resistance welding as a production tool is traced, together with its impact on the high production of ranges, dryers and washers.

WE are all familiar with resistance welding as a tool in modern high production industry, but do we all realize just how important a tool it is. Just what changes would be required if this tool were not

available? Or, where would our industry and our economy be today if this tool had never been invented? By studying a few applications of this tool at Frigidaire perhaps we can arrive at an approach to some answers.

First of all let's go back into history a little and see what has happened at Frigidaire since resistance

welding was introduced back in 1933. Figure 1 is a graph showing the growth of welding and production at Plants 2 and 3 where the bulk of home appliances are produced. We

* From a paper presented to the Dayton Section of the American Welding Society.

** Welding Engineer, Frigidaire Division, Plant 3, General Motors Corp.

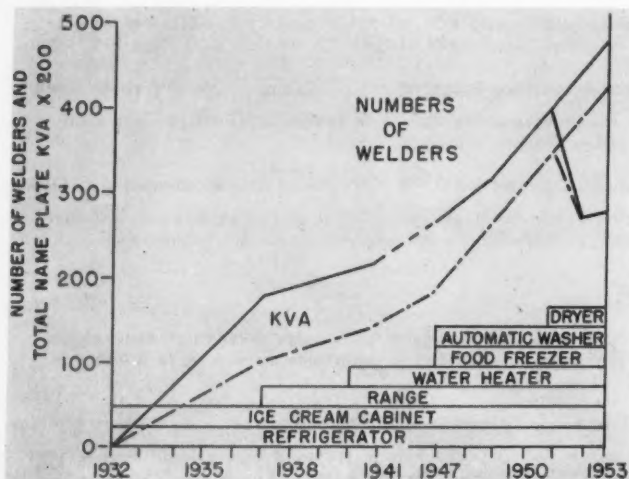


Fig. 1—Graph showing growth of welding and production at Frigidaire Plants 2 and 3.

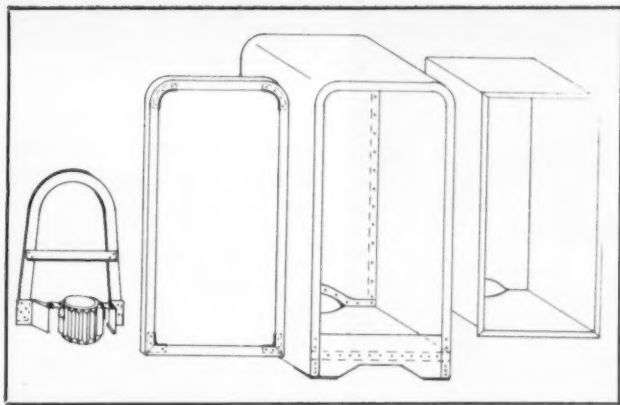


Fig. 3—Sketch of late model Frigidaire, which is completely welded.

started in 1933 with just 34 standard welders used on refrigerator and ice cream cabinet production. By 1937, when a line of electric ranges was added, 180 welders were used. The average welder was only slightly over 100 kva., for they were predominately standard spot and gun welders. In 1947, when our line included refrigerators, ice cream cabinets, food freezers, ranges, washers and water heaters, the number of welders increased to 270 with a total kva. name plate rating of 37,000. The percentage of large special welding machines increased correspondingly.

Our production and our equipment continued to increase at such a rate that in 1951, Plant 3 was opened to increase our capacity beyond that available in Plant 2 alone. The move nearly doubled the floor space, al-

lowing for increased facilities for refrigerators, ice cream cabinets and food freezers at Plant 2 and for ranges, washers, water heaters and a new dryer at Plant 3. So in 1953, Plant 2 used 278 welders with a total kva. name plate rating of 56,800 and Plant 3 used 205 welders with a total kva. name plate rating of 28,400.

Looking back again into history, we see in Fig. 2 a sketch of the 1932 refrigerator. The cabinet frame was of wood with metal panels screwed in place. Welding was still untried as a production tool. In 1933, the refrigerator shell and liner first used some welding, but on a limited scale. However, the late model refrigerator as shown in Fig. 3 has extensive

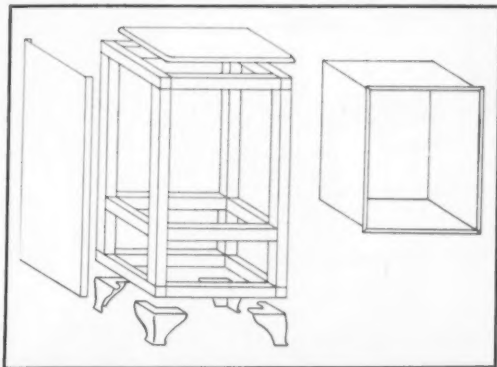


Fig. 2—Sketch of 1932 Frigidaire in which the cabinet frame was all wood and no spot welding was employed.

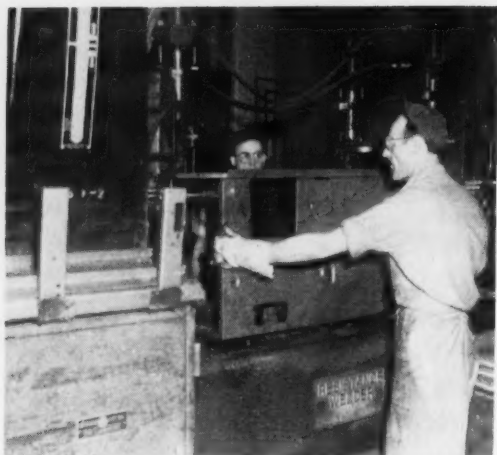


Fig. 6—Range frame being welded together on special 10-headed projection welder.

resistance welding in every major assembly.

The story of our electric range is much the same although we did not start making them until 1937. Figure 4 shows one of our first model

ranges. Welding was confined to simple spot welding on the frame, top, oven and drawer. All welding was done on standard spot and gun welders using simple fixtures and production was very low at the start.

But let's take a look at the late model range in Fig. 5. Beneath this splendor of gleaming porcelain and chrome are 235 individual pieces that are joined together by 1,150 spot and projection welds. And the amazing part of it is, these 1,150 welds required just under one hour of productive labor as calculated from our time studies. And this

Fig. 4—(Left) One of Frigidaire's first model ranges. Fig. 5—(Right) One of Frigidaire's late model ranges.

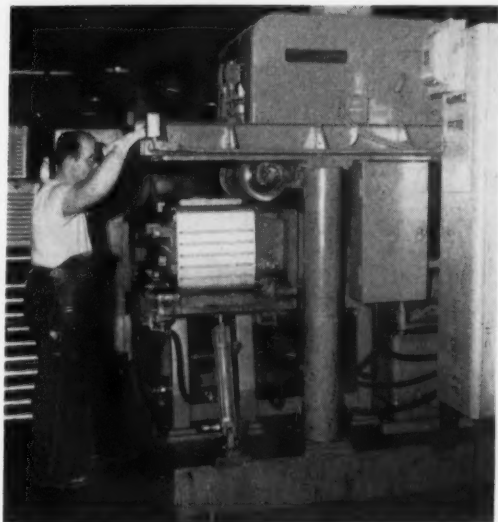


Fig. 7 — This welder takes a flat sheet, folds it up to form the bottom and sides of the oven and then seam welds the top panel in place with two series seam welds.

time includes handling of all parts into and out of the welders as well. Think for a moment what time would be required if these parts were riveted, screwed, or even fusion welded together. This is proof of the effect of this tool as used in high production.

Range Welders

But how are these 1,150 welds produced in less than an hour? Let's look into some of the special high production welders that help do this job. First, in Fig. 6, we see the basic structure of the range — the range frame—being welded together on a special 10-headed projection welder. A front and back panel, two top angles, and three bottom angles are projection welded together in ten lo-



cations simultaneously in less than a minute. The frame is then completed in a gun welding buck where corner gussets are added.

The oven lining is another important assembly in the range. Figure 7 shows a welder which takes a flat sheet and folds it up to form the bottom and sides of the oven, and then seam welds the top panel in place with two series seam welds. The next welder assembles the front and back to the oven sides and tack welds them together with 20 spot welds, preparing it for seam welding. This is done in the dual head series seam welder shown in Fig. 8. The center fixture, holding the oven, ro-

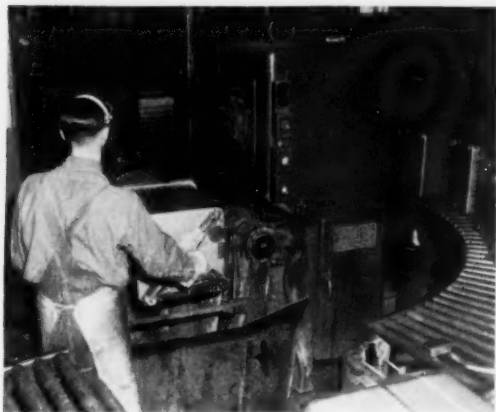
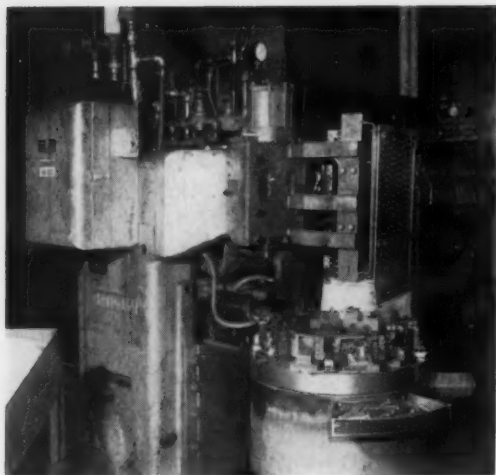


Fig. 8—Dual head series seam welder.



tates about its center, making two rolling spot seam welds all around the oven.

A typical range drawer welder, of which we have four different sizes, is shown in Fig. 9. Here the front, back, and sides are welded together with 40 spot welds in one operation. The fixture slides in and out for loading, and hydraulic guns and package transformers are used for welding.

Figure 10 shows a rather interesting index welder we recently built up for welding three different assemblies. They are the right and left oven door hinge brackets and the hinge butt. They have a similar edge projection welded joint but they were formerly welded on

Fig. 10—Index welder built up for welding three different assemblies.

two separate standard welders at a rate of 180 pieces per hour. When we first studied the job we soon found that our volume of production would never pay for two index fixtures, so we designed one fixture to take care of both. The fixture has 10 stations, the odd stations being for the hinge butt and the even stations for the right or left hinge bracket.

The indexing gear has 10 teeth but the air cylinder operated ratchet engages only every other tooth, giving a double index. Thus, only five of the stations are used at any one time. Since a single upper electrode and unloader serve both jobs, the only job change-over consists of indexing the table one station by hand. The new

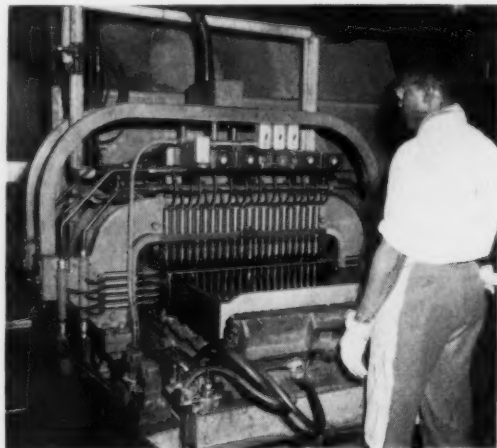
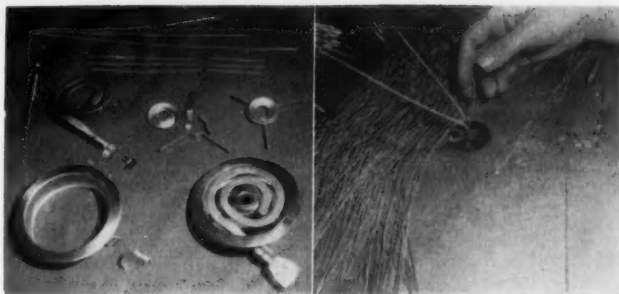


Fig. 9—Typical range drawer welder.

Fig. 11—(Left) Illustration showing the many welded parts that go into range surface heating units. Fig. 12 — (Right) Three-headed flat top welder for welding three terminal stubs to the terminal cluster which goes into the toe of the heating unit.



production rate gives us a direct labor savings per year of nearly twice the cost of the tooling.

Figure 11 shows the many welded parts that go into the range surface heating units. Stainless steel terminals are welded to the nichrome wire; after the wires are strung in the tubes and filled with magnesium oxide, an Inconel cap is Heliarc welded to the Inconel tube. The tube is then coiled and swaged to shape, after which a stainless steel heater locator and ground clip are projection welded to the tube. A stainless

steel mounting bracket is projection welded to the stainless steel adapter ring to complete the assembly.

Figure 12 shows a 3-headed flat top welder for welding three terminal stubs to the terminal cluster which goes into the toe of the heating unit. This welder is unique in that it has three single-phase transformers connected together three-phase Delta-primary Y-secondary to make all three welds with equal heat simultaneously. When this job was being set up, many ways were tried but it was found that this was the only way this job could be done satisfactorily. Notice that all three electrodes travel only a small distance into weld position, thereby serving as locators as well as electrodes.

Dryer Welders

The electric clothes dryer also has several interesting welding operations. The dryer drum longitudinal seam welder is shown in Fig.

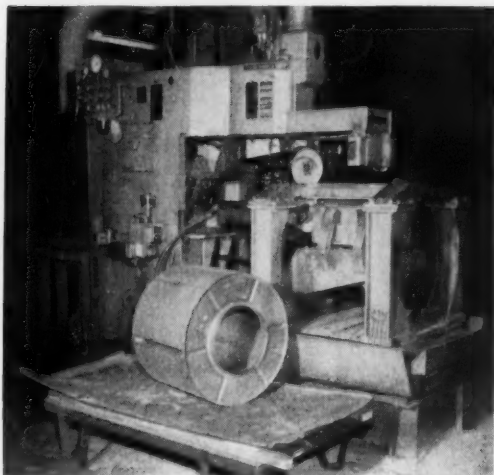


Fig. 13 — Dryer drum longitudinal seam welder.

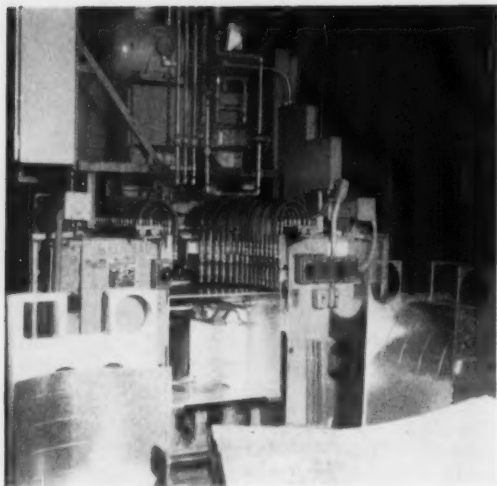


Fig. 15 — Multi-point welder which projection welds the front and back of the dryer frame to the sides.

13. Here the wrapper is taken in the flat and located over pins, giving the proper lap, and semi-mash seam welded on the traveling carriage seam welder, giving a smooth surface on the interior of the drum. The drum heads are then assembled and tack welded in place for seam welding on the circumferential seam welder shown in Fig. 14. The joint is a series of rolling spots spaced about 1 in. apart. The material is enameling iron. For clearance purposes, it was necessary to set these welding heads at a 6-degree angle. Because of this offset load on the seam welding bearings, special constant

friction heads were employed. These heads use insulated tapered roller bearings to carry the mechanical load and silver contact brushes to carry the electrical load. They have proved so satisfactory in eliminating maintenance troubles that we are considering them on future seam welding applications.

Figure 15 shows the multi-point type welder which projection welds the front and back of the dryer frame to the sides. The material is 0.040-in. galvanized sheet steel which is normally rather difficult to weld. If spot

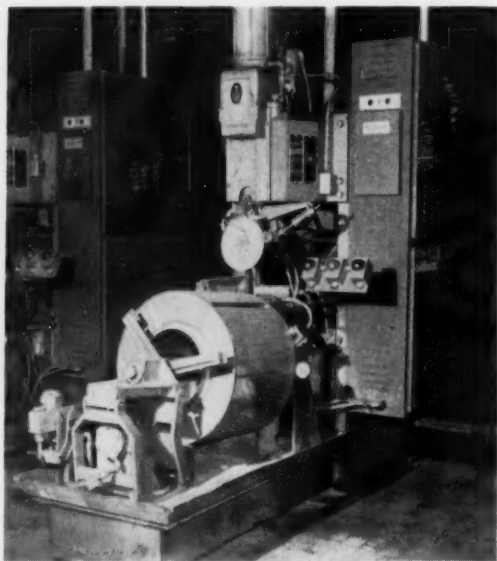


Fig. 14—Circumferential seam welder.

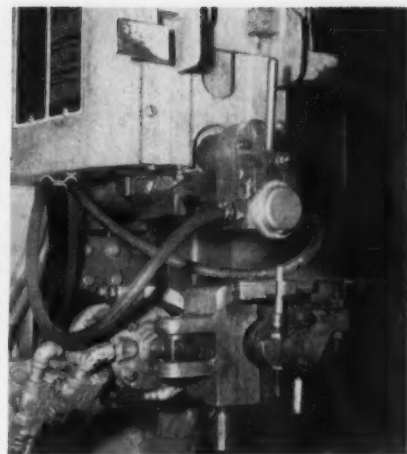
Fig. 16—Edge butt welding a drain tube up to a drain cup.

welded, considerable trouble is experienced with electrode pickup and sticking. But by using individual hydraulic guns on each projection with a push-pull package transformer arrangement, successful and consistent welding has been possible.

Edge butt welding of a drain tube to a drain cup is shown in Fig. 16. A satisfactory design for this joint caused us a great deal of concern until we fell upon the idea of extruding the hole in the drain cup into which the tube was to be welded. It was then a simple job for this standard press welder.

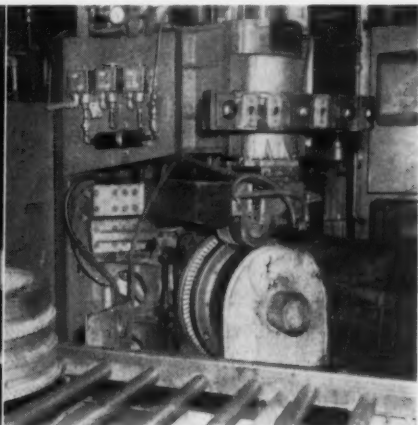
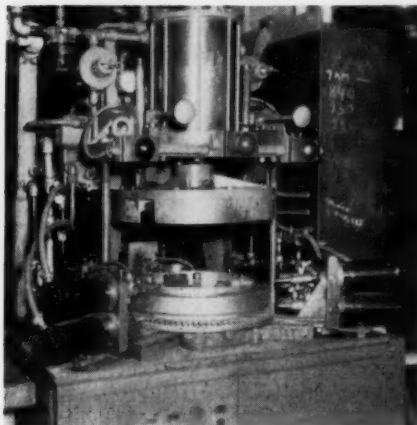
Automatic Washer Welders

Let's take a look at several interesting operations and assemblies on the automatic washer. One new as-



sembly we have taken over since Plant 3 was started is the tub assembly. In Fig. 17 we see the first operation where the tub rim is pressed into the tub rim housing and spot tack welded prior to seam welding. Note how the pressing and tacking are combined in one machine. The

Fig. 17—(Left) Tub rim is pressed into the tub rim housing and spot tack welded prior to seam welding. Fig. 18—(Right) The parts are then seam welded on the special dual head seam welder shown herewith.



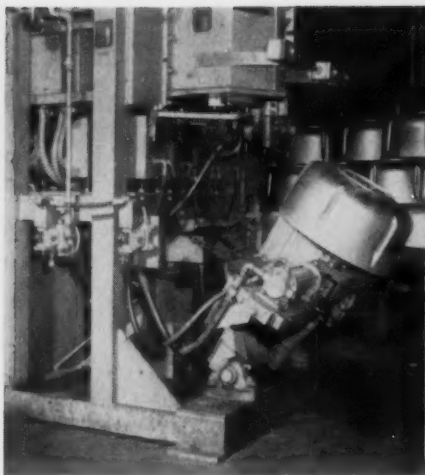


Fig. 19—(Left) A reinforcing ring is welded to the bottom of the tub on this multi-spot welder. Fig. 20—(Right) Next, six reinforcement plates are projection welded to the tub on the press welder with index fixture shown in this illustration.

parts are then seam welded on the special dual head seam welder shown in Fig. 18. To make these two pressure-tight seam welds simultane-

ously, it is necessary to use separate pressure rams, separate welding transformers and separate synchronous controls for each weld.

Fig. 21—(Left) The tub and rim are pressed together in the machine shown herewith and spot tack welded at the same time. Fig. 22—(Right) The tub assembly is completed by semi-mash seam welding the joint, ironing it out smooth on the inside surface on the circular seam welder illustrated herewith.

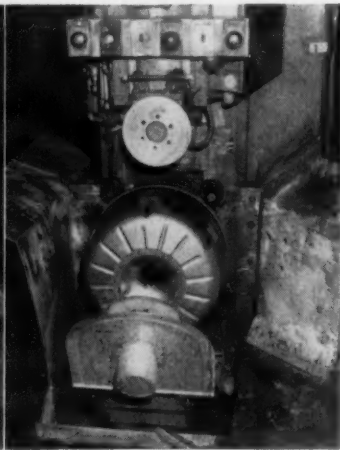
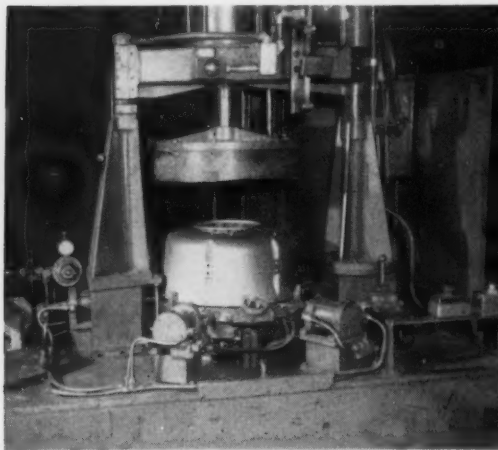
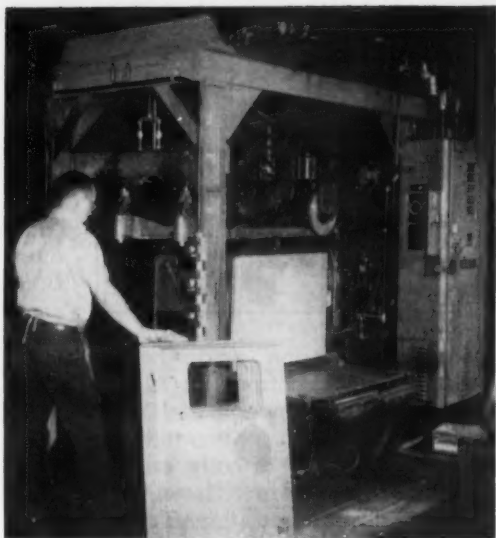


Fig. 23 — This welder folds up the sides of the shell from the flat and seam welds the back panel in place with two longitudinal seam welds.

Figure 19 shows the welding of a reinforcing ring to the bottom of the tub on the multi-spot welder. The center fixture hinges out for loading and indexes to four positions to make a total of 16 welds. Next, six reinforcement plates are projection welded to the tub on the press welder with index fixture as shown in Fig. 20. A shuttle feeds the plates into the upper electrode one at a time, speeding up the loading time and keeping the operator's hands clear of the welding electrodes.

The tub and the rim are then pressed together in the machine shown in Fig. 21 and spot tack welded at the same time. The fit of the



parts is so close that a 5,000-lb. force is required to press them together. The tub assembly, which is entirely enameling iron, is completed by semi-mash seam welding this joint, ironing it out smooth on the inside surface on the circular seam welder shown in Fig. 22.

The cabinet shell of the automatic washer is also a welded assembly. In Fig. 23 we see the first welder in this line which folds up the sides of the shell from the flat and seam welds the back panel in place with two longitudinal seam welds made on this traveling carriage dual head series seam welder. Figure 24 shows a special

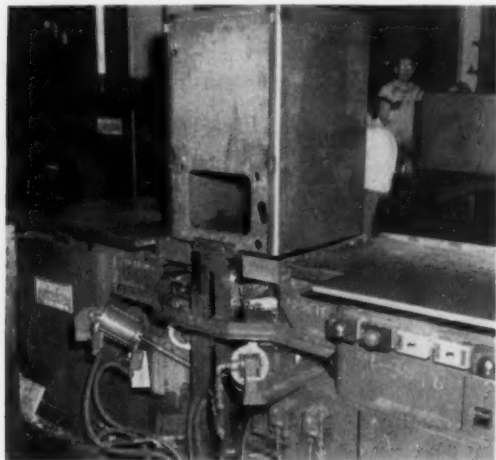


Fig. 24—Special 4-headed projection welder which welds the four bottom gussets to the shell.

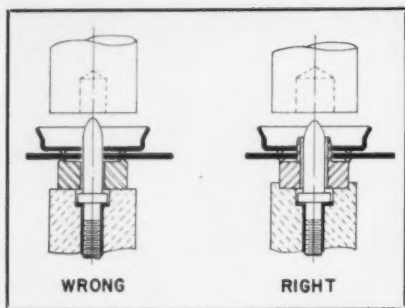


Fig. 26—Sketch showing "Wrong" and "Right" methods for projection welding a cup and nut to a plate.

Design Considerations

In our discussion of welding equipment for high production, we must give a great deal of consideration to design, both joint design and equipment design. We are all quite familiar with the more standard time-proven design rules, so the following cases illustrate a few that may be out of the ordinary that we have come across.

First of all, try to incorporate some method of self location into your joint design. This can be done in many ways, but one simple way is shown in Fig. 26 where we see a cup and nut being projection welded to a plate. In the "Wrong" joint design, a pin locator is used through all three pieces, causing a constant burning of the pin and the threads. In the "Right" joint design, the nut

4-headed projection welder which welds the four bottom gussets to the shell. Note how the welder is built at conveyor height so that the shell can be slid directly on the loading elevator which lowers the shell into welding position. The inner heads then expand and the two transformers fire in sequence to make two series welds each. The elevator then returns the shell to conveyor height for unloading without any lifting of the shell.

In Fig. 25 we see another 4-headed projection welder for welding the top gussets to the shell. This welder is similar to the previous welder except that it is built upside down. This was done so the gussets could be loaded on the lower electrodes since they are welded on the inside of the shell. Also, it eliminated turning the shell upside down for this operation and back again for the next operation.

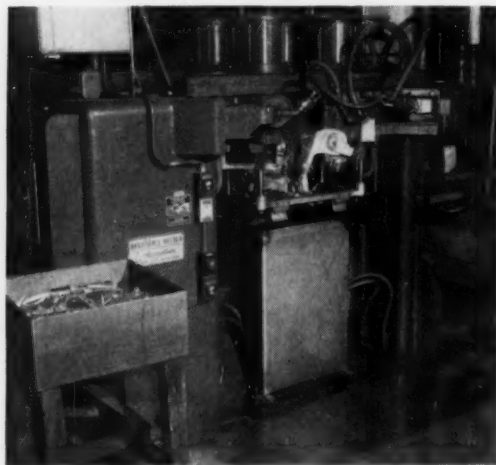


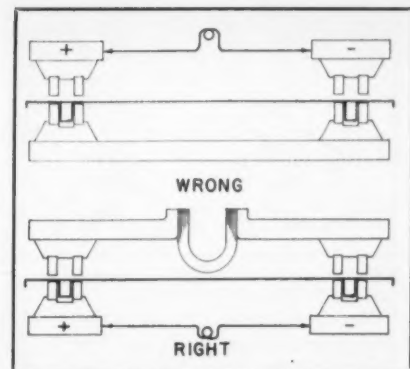
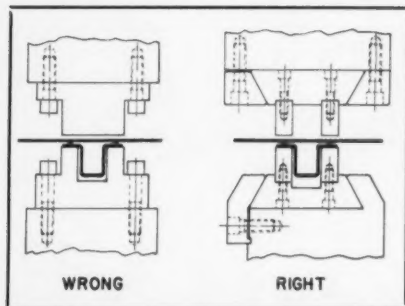
Fig. 25 — Four-headed projection welder for welding the top gussets to the shell.

Fig. 27—Sketch showing "Wrong" and "Right" methods for series welding two brackets to a panel.

includes a pilot which locates the other pieces and protects the threads.

Series welding is a wonderful way to get double use out of welding current, but there are certain rules which must be followed. The most important one is to force the welding current through the joints instead of allowing it to shunt across one sheet. This is illustrated in Fig. 27 where two brackets are being welded to a panel. The "Wrong" method shows the current being introduced on the panel side where it may shunt across. The "Right" method is to introduce the current from the bracket side, so the current must go through the projections in order to complete its circuit. In this case it had an added advantage because the top side of the panel was a "show" side, later receiving a white porcelain finish. Surface burning on this side is greatly reduced because the sheet again carries a majority of the current, but this time to our advantage.

In the design of resistance weld-



ing equipment, the important part of the tooling is properly designed electrode inserts, not only to give good welding results but also to reduce maintenance on these highly perishable items. Figure 28 shows several ways in which electrodes can be designed to help the maintenance man. First of all, small inserts are used instead of one large block because they are easier to make and they conserve copper alloy. Next, a standard gib design allows the electrodes to be removed by merely loosening the gib screws rather than removing several screws entirely. The screw heads should also be protected from welding flash, if possible.

If there is an angle involved in the parts being welded, try to design the electrodes so that the alignment of the parts will not be disturbed when the electrodes are dressed after wear. This is shown in Fig. 29. If the "Wrong" electrode is used, the lower electrode must be discarded

Fig. 28—Sketch showing "Wrong" and "Right" designs for electrode inserts.

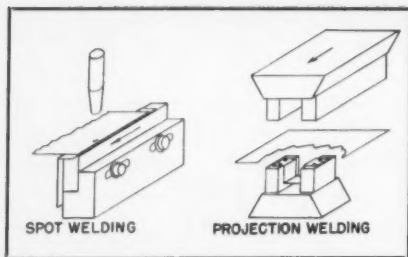


Fig. 30—Sketch of movable electrode design for spot and projection welding.

after one dressing. But if the "Right" electrode is used, the electrode may be dressed often and can easily be adjusted for wear with the jack-screw.

Figure 30 illustrates what we have called a movable electrode design. Essentially it is an electrode insert which can be adjusted back and forth to distribute wear along a greater surface of the electrode. The left section shows it being used on spot welding. On one of our applications where we were welding aluminum clad steel, we found the lower electrode life to be several dozen times longer after we made the electrode movable because of the high pickup of aluminum. The projection welding application showed a similar savings. In this case, the show side of the panel was against the movable electrode, thereby reducing the metal finish required on the panel as well as reducing the maintenance problem.

Safety Considerations

At Frigidaire we are quite proud of our safety record and the emphasis that we place on safety consid-

erations. General Motors and Frigidaire spend great sums of money each year for safety devices of all types. Of course, the primary concern of our department is to make welders more safe. Several years ago we began a program of installing mechanical safety latches of the types shown in Fig. 31 on all our press welders. This program is now complete, and all new welders require these latches upon installation. These dual latches keep the ram from operating for any reason until the operator presses both palm buttons to swing the latches clear and close two limit switches. They return by gravity, so they are virtually foolproof. This particular set of latches, since it is on a rather long stroke welder, is so connected that the operator must keep his hands on the buttons until the weld begins. Figure 32 shows a dual head press welder with one latch on each head. Notice also that hand clamps are used on this fixture for maximum safety.

In Fig. 33, we see a welder for which we found it virtually impos-

Fig. 29—Sketch showing "Wrong" and "Right" methods for designing electrodes where there is an angle involved in the parts to be welded.

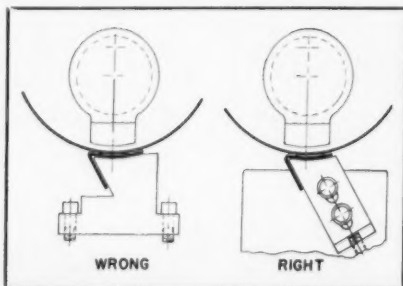
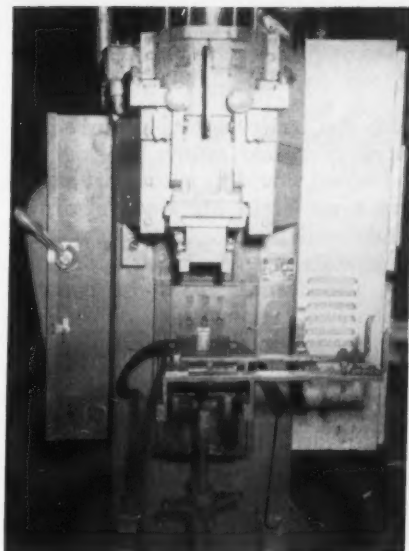


Fig. 31—Press welder equipped with mechanical safety latches.

safety latches. This was because the large upper electrode fixture is mounted on a rather small diameter shaft. The off-center load which would occur if only one latch would catch would be enough to distort the whole fixture. In this case, we have devised a blocked-off air valve to serve as a safety device. Note that the solenoid air valve mounted on the upper left of the welder has a lever bar alongside of it. The valve is of the sliding spool type, the shaft of the spool projecting out from the valve body about $\frac{1}{4}$ in. when the solenoid is energized. The lever bar prevents the valve from operating for any reason until the operator pushes the lever back with one hand, closing a limit switch, and pushes a palm button with the other hand. We have also used these blocked-off valves on multi-head welders where



the application of safety latches was impractical.

Figure 34 shows a special welder for welding four bulkhead support strips to the washer shell. It is essentially an inverted press welder since the ram is mounted on the lower portion and the knee mounted above. Here again, conventional safety latches were impractical, so in this case we have air operated latches. However, to give added safety, the circuit is so connected that the one palm button pushed by the operator unlocks both latches which, in turn, hit limit switches in series

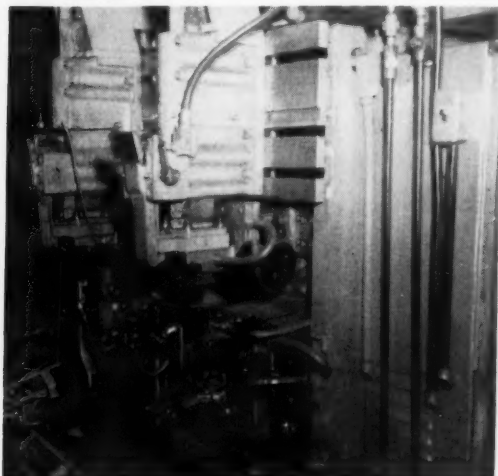
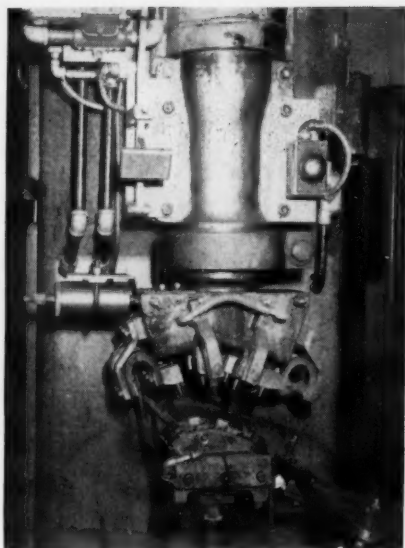


Fig. 32 — Dual-head press welder with one mechanical safety latch on each head.

Fig. 33—Welder equipped with a blocked-off air valve to serve as a safety device.

with the other palm button. Thus, more than one switch or solenoid valve coil would have to short out to cause an accident. Note also the choke coil mounted on top of this welder to ground the secondary of the transformer. In most conventional welders one side of the secondary is grounded directly to the frame of the welder to prevent the operator from forming a ground if the transformer shorts out primary to secondary. This direct ground is not always practical, as in this case where it was impractical to insulate the entire lower fixture. Therefore, the fixture was bolted directly to the frame and both sides of the secondary were insulated. The choke coil is connected secondary to ground, allowing a very low amperage to leak to ground at normal welding voltages. But if 440 volts should de-



velop in the secondary, the coil would form a direct ground.

Conclusion

By giving these few examples of specialized welding equipment, we

hope that we have shown how high production welding is applied in the appliance industry. But ours is not always a problem of higher production rates from the machines themselves. In all these cases shown, material handling was just as important a problem, and more complete automation is coming into the picture very rapidly. Proper consideration

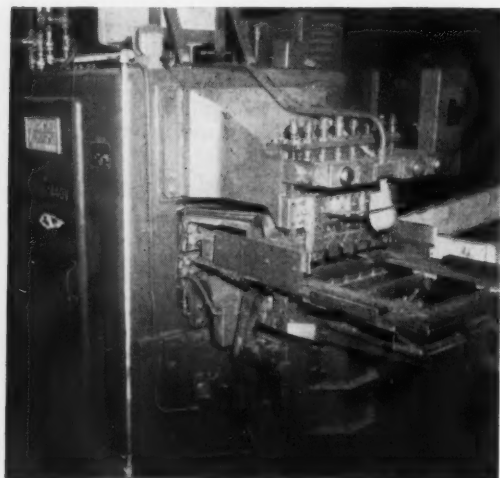


Fig. 34—Special welder equipped with air-operated safety latches.

must be given to both the design of welded joints and the design of equipment if satisfactory results are to be obtained.

Once a welder is in production, it must be kept running. Therefore, the machine must be built with the maintenance man in mind. And most important of all, it must be safe—safe for everyone who works around it.

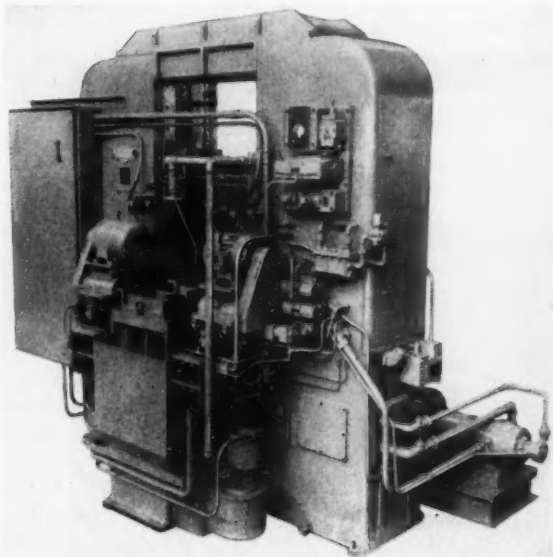
Resistance welding has done much to supply the needs of a growing market in the appliance industry at a price which is attractive to this market. But we should never forget that without the great volume demand which we try to satisfy, all of our high priced special equipment would be impossible. Supplying

more goods at lower costs so that more people might enjoy them is the part of our economy which has made our country great. May our technical advances help it to continue in this direction.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

Combination Broaching and Centering Machine for Transmission Shaft Forgings

THIS special machine built by American Broach and Machine Co., Ann Arbor, Mich., is designed to broach and then center drill the ends of automotive main transmission shaft forgings, two at a time. Two standard vertical hydraulic broaching machines, each of 10-ton work capacity and with a broaching stroke of 36 in., were adapted to a common center base. The vertical columns of the machines were joined at the base and top to form a rigid integral unit. Mounted on the table is a hydraulically operated lateral slide, which moves the fixture and locks it at the broaching and centering station.



Essentials in Good Gage Practice

Part I

By C. W. KENNEDY

I *This article covers certain phases of gage practice and construction of particular value to those whose job it is to consider, select, help to design, purchase or use special purpose gaging equipment.*

ONE of the continuing strong trends in the machine shop business is the increasing swing to narrower tolerances and closer fits and, consequently, greater concern over the conformance of parts' dimensions to the blueprint. At the

same time modern, faster production tolerates few pauses or delays from any methods used either by operator or inspector in checking dimensions.

Many of the conventional and traditional methods of measuring are giving way to more modern instrumentation because the old-fashioned method is either too slow or too inaccurate for present-day requirements. The prevailing tendency is to design and make a specific gage for the job or at least to modify available equipment so as to perform a particular function.

A number of shops turn

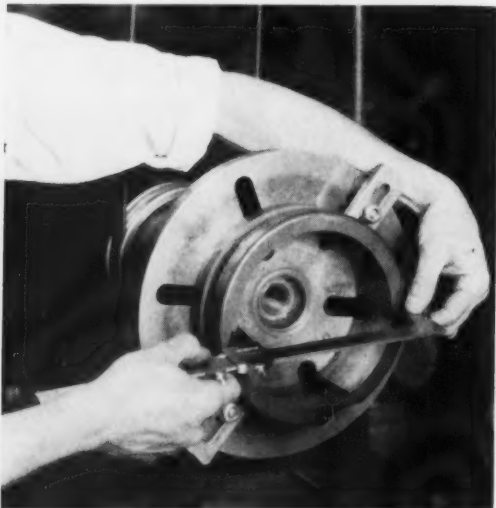
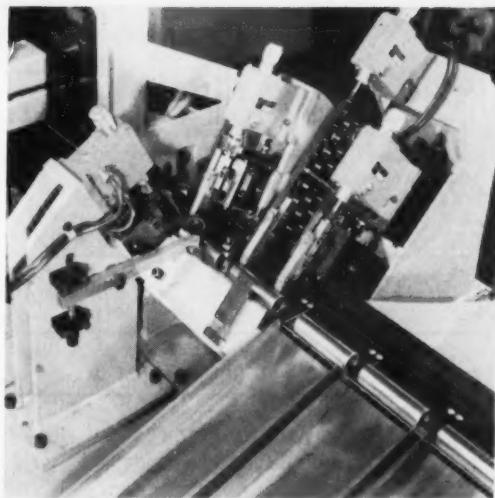


Fig. 1—Whether it's a conventional measurement of the type illustrated herewith or an intricate mechanism that triggers an automatic gage of the type shown in Fig. 2, correct gaging principles must be inherent in the apparatus.

Fig. 2—Whether it's a conventional measurement of the type shown in Fig. 1 or an intricate mechanism that triggers an automatic gage of the type illustrated herewith, correct gaging principles must be inherent in the apparatus.



such problems entirely over to the gage manufacturer who has been progressive enough to foresee the conditions implied in the paragraphs above and has set up to design, make and supply special purpose gages. Some plants put gage design entirely up to their own engineers and toolrooms. A third prevailing system for solving knotty gaging problems brings the gage company's engineers to working in direct cooperation with its customer's personnel.

As a result, it is becoming increasingly necessary for those who will consider, select, help to design, buy or use special purpose gaging equipment to have at least an appreciation of certain basic gage design principles. There is less room than ever in today's shops for the gage amateur as well as the character who sticks defensively to the traditional, obsolete and ponderous methods of checking conformance of product.

There are several factors or elements in the design of a gage that need to be known and remembered if the result is to be successful. A gage design may have to compromise with some fundamentals on occasion, but to entirely overlook or deliberately ignore certain essentials can mean an expensive loss in labor

and material contriving a dud. Whether it's a conventional measurement of the type shown in Fig. 1 or an intricate mechanism that triggers an automatic gage of the type illustrated in Fig. 2, correct gaging principles must be inherent in the apparatus.

Friction and Sensitivity

Measurement — gaging — inevitably entails transfer in some form. A micrometer transfers a diameter or thickness to graduations on its barrel and thimble. Projectors and other light ray apparatus use optical means. Measurements are transferred through tubes by means of compressed air as in the air gage, or through wires to an electronic device. The majority of gages, however, depend upon some form of mechanical transfer. And then, unless the designer watches out, mechanical transfer will involve friction.

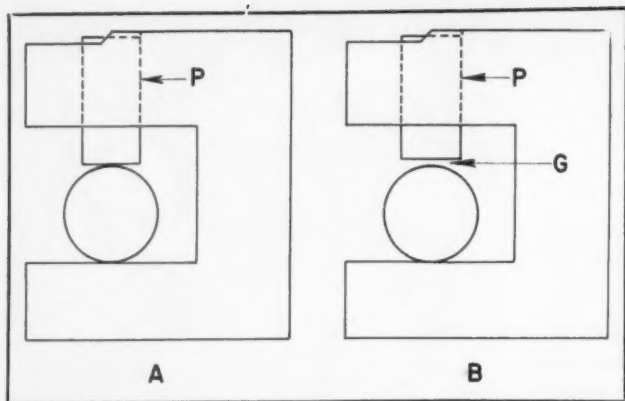


Fig. 3 — As indicated in this somewhat oversimplified diagrammatic sketch, the average flush pin gage affords a good example of the way plain friction can block fine measurement.

between plunger and workpiece, as illustrated at B in Fig. 3. Sometimes the end of the pin "homes" solidly but, the instant the pressure on it relaxes, the pin retracts a trifle—it springs or shrinks back, in a way, because the resisting friction forces still acting on the pin tend to hold it up.

The effect of friction in a gage mechanism can be likened to the way rheumatism cramps a man's fingers. They may continue to do their work, but more clumsily. Normal coordination, dexterity and sensitivity are lacking. On the whole, friction, resulting in lack of sensitivity, is an active enemy of precision measurement.

The average flush pin gage affords a good example of the way plain friction can block fine measurement. Ordinarily, the diameter of the plunger (see *P* in the somewhat oversimplified, diagrammatic sketch in Fig. 3) is carefully ground, if not lapped, to provide somewhat of a force fit in the frame hole reamed for it. Therefore, quite a little finger pressure is needed to push the pin down onto the workpiece for the measurement.

But then, because of friction, the exact measurement may not be obtained. The plunger or pin may seem to be down firm against the workpiece when actually the friction against the pin offers the equivalent sensation and actually there is a gap

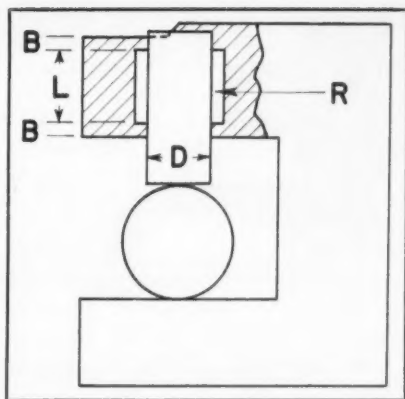
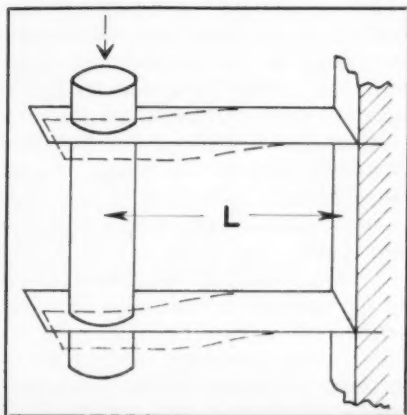
between plunger and workpiece, as illustrated at B in Fig. 3. Sometimes the end of the pin "homes" solidly but, the instant the pressure on it relaxes, the pin retracts a trifle—it springs or shrinks back, in a way, because the resisting friction forces still acting on the pin tend to hold it up.

The space or gap *G* in view B of Fig. 3 is, of course, greatly exaggerated in the sketch. The lack of complete contact may be a matter of only a few millionths of an inch but contact failure can also produce a measurement error of several ten thousandths under certain conditions. Its effect on the results from a flush pin gage would probably go unnoticed, because flush pins operate in tolerance ranges of several thousandths, but similar friction effects in dial indicators, bore gages and other precision measuring tools can cause trouble. As an example, a dial indicator which, through neglect, has been allowed to get sluggish with oil, dust and grit, is liable to fail to detect the full extent of out-of-round because its spindle point cannot fall back fast enough as an egg-shaped piece is spun around under it.

Fig. 4—One way to reduce friction and to maintain the sensitivity required for fine measurements is to relieve the hole through which a plunger rides, as shown in this sketch.

Many bore gages now on the market use retracting plunger or split plug devices which can give an excellent impression of securing the full measurement and yet, because of friction in the plunger mechanisms, fail to make complete, accurate contact. Evidence that the gage contacts many times did not "home" completely, as they first expanded into the bore, is shown by the gage indicating device, continuing to "creep" a few tenths more if the gage is kept in contact with the bore being measured.

Where a plunger mechanism as a means of transfer cannot be avoided in extra precise gage construction, the professional gage designer can lean on a trick or two of the trade to reduce friction and to maintain the sensitivity required for fine measurements. One stunt is to relieve the hole through which a plunger slides.



The idea can be readily seen by referring to Fig. 3 again and then contrasting the movement of the plunger in a straight sleeve (Fig. 3) with its sliding in a relieved hole, as shown in Fig. 4. The relief *R* (Fig. 4) can be undercut anywhere from a few tenths up to any reasonable i.d. desired. The width of bearing or land (*B* in Fig. 4) can be about one quarter of the plunger diameter *D* and frequently even narrower. The particular stunt, however, is to have the length of the relief (*L* in Fig. 4) greater than the plunger diameter.

Where tolerances are close, however, and extra precise measurements are required, the gage designer sometimes eliminates internal gaging friction entirely by resorting to a reed device, as shown

Fig. 5—Where tolerances are close and extra precise measurements are required, the gage designer is liable to eliminate internal gaging friction entirely by resorting to the reed device shown in this rough sketch, where a plunger or spindle is suspended between a pair of cantilever springs.

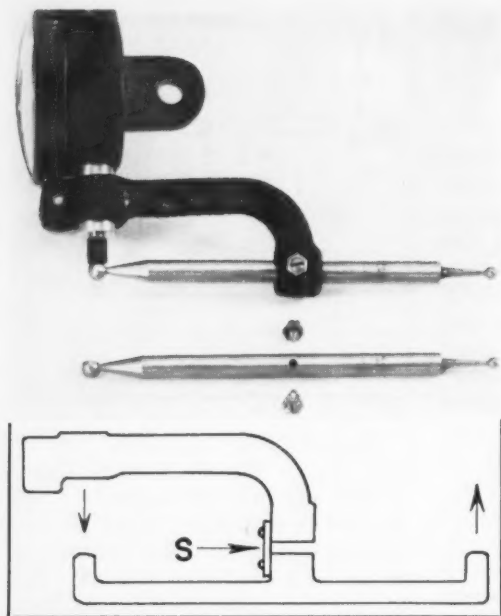


Fig. 6—A common mechanism to illustrate another favorite transfer method is the so-called hole attachment shown herewith, which is used as a supplement to a dial indicator on a test set.

allowed to exceed 0.100 inch.

Another favorite transfer method depends on pivots or on hinges. A common mechanism to illustrate the principle to be discussed is the so-called hole attachment, used as a supplement to a dial indicator on a test set.

One such attachment is shown in Fig. 6. The basic operation of this apparatus depends on its arm pivoting on a pair of hardened

pointed screws. Its friction resistance can be reduced to a minimum by having an extra smooth finish or the conical screw points mating into similarly highly finished holes in the tilting rod. On the other hand, provision is allowed for tightening the conical screws into the pivot holes ostensibly to prevent side play and looseness. When the screws are tightened, however, pressure, friction and resistance are imposed on the normal free play of the hinge. It can be oiled, true, to reduce friction, but a lubricant is a natural dust and grit attracter.

Notice how all the effectiveness of the transfer is maintained by the equivalent apparatus illustrated in the sketch combined with Fig. 6. Instead of conical screw point pivots, a frictionless leaf spring *S* is

in Fig. 5, where a plunger or spindle is suspended between a pair of cantilever springs. Here there is no friction to bind or brake (other than the relatively theoretical, internal hysteresis in the springs). A gage incorporating this principle gives repetition right on the nose. It has unimpaired sensitivity. The amount of gaging pressure needed will depend on the size, the spring rate and elasticity of the reeds selected.

One drawback in spring suspension is the limited gaging range offered. Depending on the elastic limit and spring rate of the reeds selected, on the leverage or cantilever length (*L* in Fig. 5), and similar factors, the spindle or plunger travel may be limited to 0.010 in. and, in this type of gage construction, seldom is

used as a "hinge." The latter also eliminates looseness and side play and transfers the measurement with errorless repetition. Its only possible limitation shows up in spring rate. The extent of its travel or range is restricted by the elastic limit of the leaf spring hinge.

Many a gage designer of both the homespun variety and the professional variety has faced a situation where it has been necessary or at least convenient to devise a measuring transfer mechanism which will turn a corner. There are situations where the diameter, depth or eccentricity must be actually measured in one location but where it would be easier, if not absolutely required, to transfer that measurement onto an indicator placed in a different plane or at an angle in line with an operator's eyes. A sort of hypothetical case is illustrated in Fig. 7. Here the depth of a bore or slot in a workpiece, *W*, can, for several reasons, be best checked by upending the workpiece over a gage contact. As Fig. 7 shows, the depth measure-

ment is transferred to an indicator vertical before the inspector's eyes by a toggle mechanism in the gage base.

The chances for friction, for lack of complete contact, for looseness, toggle play and other transfer errors causing lack of repetition and accuracy are numbered on the sketch—at least seven of them. By its very nature, to make such a transfer mechanism completely errorproof would demand precision workmanship of a very high order and, consequently, the apparatus initially would be very expensive. Then, even at its best, such a mechanism could readily pick up oil, dust and grit and either bind up tight or else the pivots would wear sloppy.

The gage mechanism sketched in Fig. 8 takes advantage of the hinge spring principle which offers a fric-

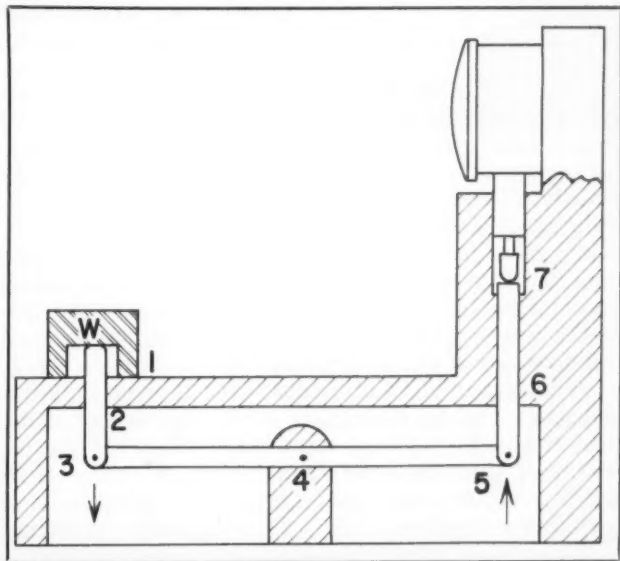


Fig. 7—Many a gage designer has faced a situation where it has been necessary or at least convenient to devise a measuring transfer mechanism which will turn a corner, such as indicated in this hypothetical case.

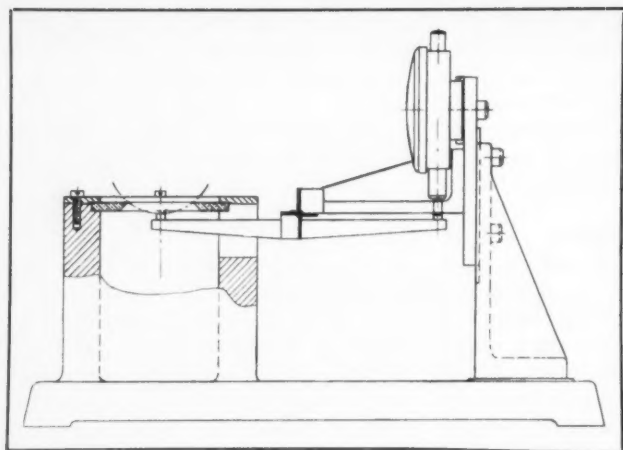


Fig. 8—The gage mechanism shown in this sketch takes advantage of the hinge spring principle which offers a frictionproof, dirtproof and wearproof method of turning a corner.

tionproof, dirtproof and wearproof method of turning a corner. Contrast the complete simplicity of the layout with the toggle mechanism outlined in Fig. 7. Rather evidently the transfer mechanism will assure accuracy and repetition through indefinite use.

Inertia

Today's gage designer has to take into account inertia effects as well as intelligently handle the ever present compromise between friction, sensitivity and range in planning transfer and indicating devices. For many years in the past, industrial linear measurement was confined to instruments like micrometers, vernier calipers, fixed plug and snap gages, or optical means were employed. The inspection of individual dimensions was necessarily in slow motion and the idea of inertia affecting the completeness or accuracy of a measurement probably occurred to only a few.

In these days production demands

ing equipment. Modern automatic gages will handle as many as 20,000 parts per hour or more. In continuous gaging, sheet metal, for example, swishes through a calipering mechanism at something like a mile a minute clip. And in the very latest implementation which controls size by automatically controlling the high speed machine itself, the gaging mechanism sometimes has to do its stuff in a fraction of a second.

So the gage designer of this era finds himself studying weight, mass, moments, and even the G's of centrifugal force. If he comes up with a gaging mechanism that is too ponderous to operate quickly and accurately, his gage will either miss getting the measurement entirely or its inertia lag, like friction, will let it sense only a partway, inaccurate reading which is worse than none at all.

The modern dial indicator should be thought of as a precision and highly responsive instrument. An indicator hand swings to take a read-

accurate measurements quickly. An inspector sorting up to a thousand pieces an hour needs responsive gaging

ing in a twinkling of the eye. Yet in its dash to its measurement destination it overcomes inertia all the way. Figure 9 shows an enlargement of a film taken at 3000 frames per second. It was calculated that at this instant the hand was accelerating at 39,000,000 radians per seconds. At this indicator speed, which it assumes when pressed into severe service, the hand becomes momentarily deformed to a hook-like contour from inertia.

In this case the designer has been successful in producing an indicator hand just heavy and stiff enough to fully recover its normal shape after wicked punishment. A heavier hand, which might deform somewhat less, would increase the inertia force and bearing friction and therefore decrease the indicator's sensitivity and accuracy.

A complete treatment of inertia effects would be unnecessarily long and obtuse here. One often unthought of effect of inertia in fast moving gage mechanisms could be brought out however. It is easy to think of the lag in a gaging mechanism caused by inertia as that mechanism is getting into action—as it accelerates to maximum speed. But the same inertia, now in reverse, puts the brakes on and retards the motion of the mechanism in its return or recovery stroke. In a gage, deceleration must be as complete as acceleration.

The effect of deceleration inertia can be sometimes observed in the final slight flutter of an indicator hand just as it comes to rest for the reading. Deceleration inertia shows up as backlash, for instance, in gage toggle mechanisms. Unless inertia

in both directions is calculated on and accounted for, it may affect not only the speed of gage response but also completed measurement accuracy and repetition.

Repetition

Repetition is the acid test of any measurement. Most generally the measurement that can be repeated will be correct. To put it the other

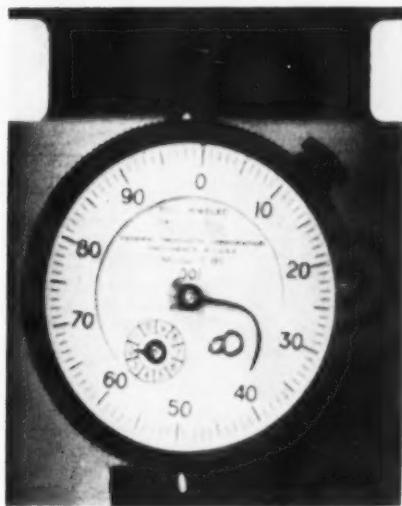


Fig. 9—This illustration of an enlargement of a film taken at 3000 frames per second shows how a dial indicator hand becomes momentarily deformed to a hook-like contour from inertia when the indicator is pressed into severe service.

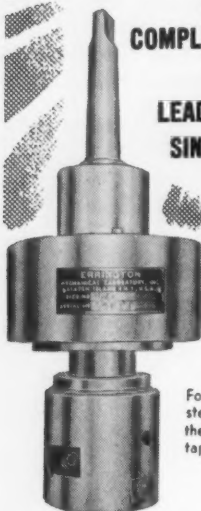
way, the chances are practically perfect that lack of repetition spells something amiss in the gaging system that could be corrected.

The use of the words "gaging system," just above, implies not only inherent mechanical errors of friction, looseness, play, deflection and the like, but also errors or lack of repetition which are brought on by

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dirt, for instance, or by temperature change; again perhaps, by incorrect geometry of application or use. Human frailty in manipulation of gaging equipment can never be ignored especially where repetition is concerned. The gage designer's ingenuity must be constantly applied to eliminating, mitigating or, at worst, to compromising with those conditions that bring about inaccuracy and lack of repetition.

(There are other basic conditions with which a gage builder contends and other fundamentals he employs in correct design. Some of these will be discussed in another installment to be published in the next issue.)

Octopus-Type Vacuum Chuck

On octopus-type vacuum chuck developed by Convair, Division of General Dynamics Corporation, San Diego, is shown here on a skin milling machine. The suction cups use removable rubber grommets. A screw in the center hole serves as a shut-off valve, thus allowing any shape skin to be placed on the chuck without complicated sealing-off of the vacuum source. Approximately 1,000 suction cups can be used to hold skin during milling operations.



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Machining Stainless Steel

By G. J. STEVENS*

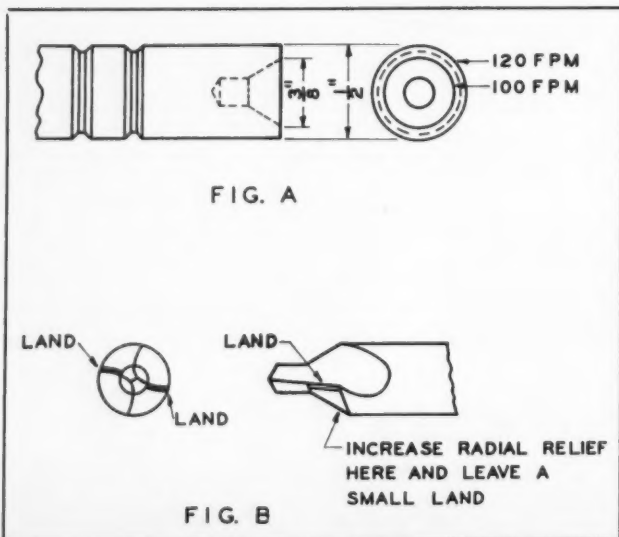
This case history shows how premature drill failure was overcome in a center drilling operation which was performed on a small shaft made of Type 303 stainless steel.

Problem: A small shaft made from 1/2-in. o.d. Type 303 stainless steel in a Brown and Sharpe automatic required a 3/8-in. o.d. counter-

sink that was to be produced with a standard center drill. The operating speed of 120 f.p.m. was satisfactory for all of the machining cycles with the exception of the center drilling operation. Premature drill failure

was experienced because of the high feed per minute rate (see Fig. A).

Solution: The radial relief of the center drill was increased as shown in Fig. B. This design reduced the bearing area of the countersink section of the drill to a narrow land only and resulted in greatly improved operating performance of the tool.



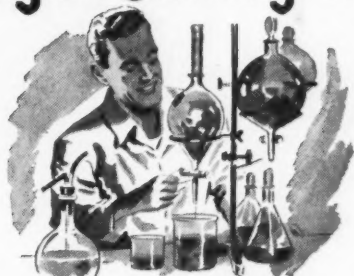
* Machining Engineer, Armco Steel Corp.

How to Pick the Right Cutting Oil



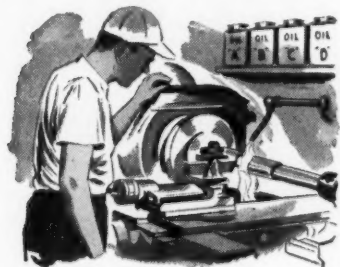
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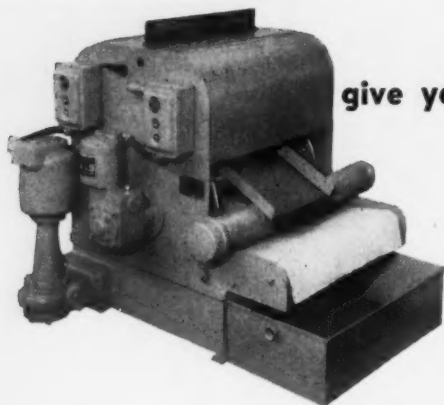
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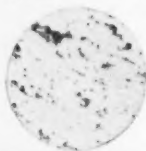
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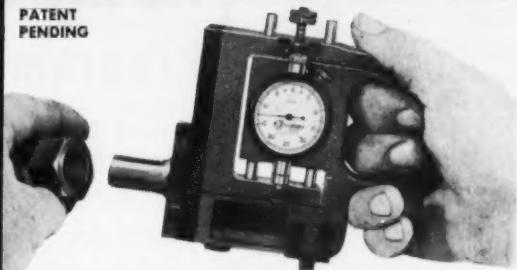
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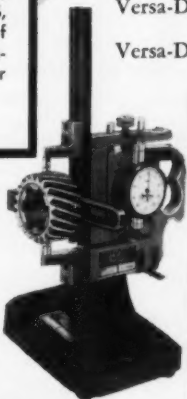
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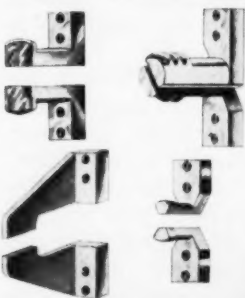
Versa-Dial HELICAL GEAR PD COMPARATOR
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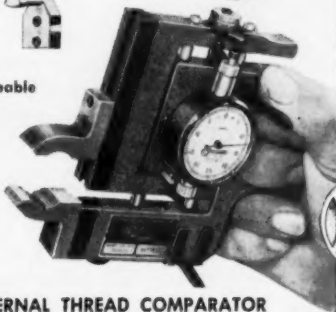
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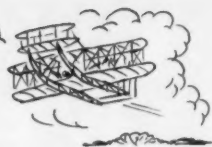
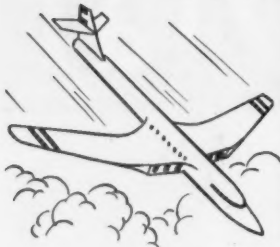
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Streamlining



the Accident Prevention Program

In which the author discusses possible revisions in accident-prevention activity in certain industrial plants.

By ALFRED M. COOPER

THERE are certain times when it is wise to scrutinize carefully the overall accident-prevention program in operation within any industrial plant. Particularly is this true if any changes in the training program in safety are contemplated.

While a realistic evaluation of all phases of the existing safety program is being considered, this may be the time to formulate and apply a simple yardstick by which the worth of any such project may be readily measured. The simplest, surest criterion I know of for this purpose is the answer to this question: Has the present safety program served to steadily reduce the frequency and severity rates of injuries since its installation, in a degree satisfactory to management?

An honest answer to this question

automatically determines whether or not the existing program of accident prevention should be continued in effect without alteration, or whether minor or radical changes in the setup are in order. In dealing with so serious a matter as life and death there is no room for excuses, temporizing or lengthy debate. If, for example, the accident rate is found to be actually increasing, then certainly this is the time for changes, and the immediate need is to decide whether improvements here and there will do the trick, or whether a major overhaul is indicated.

If we carefully apply this yardstick to certain efforts that are now being made to reduce accidents within industry, in the home and on our highways, we must appreciate that too much of our present accident-

prevention activity does not prevent accidents. Thus, where efforts have been made to make people more safety-minded by the reiteration of countless catchy slogans, by everlastingly haranguing them on the evils of carelessness, by compilation of statistics or by attempting to frighten folks into playing it safe, it may be difficult to prove that such tactics ever have prevented a single accident from occurring.

But this is not all. Both industrial employees and highway users will accept about so much safety instruction without rebelling, and any time and effort we devote to this activity had better be properly directed. There is no place here for pretty generalities. Otherwise there is too great a tendency on the part of the very individual who must be reached to say, "Ho hum! Be careful. Stop having accidents. Watch your step. More of the same old stuff." *Yet this bored fellow may be the very one who needs most to have his work habits or driving habits improved.*

As a matter of fact, any industrial training program, at the outset, may well have two strikes against it. The employee's memory is long enough to bring to mind earlier training he may have undergone (perhaps in another plant) which was improperly conceived and faultily executed. For this reason, even the most effective training programs must have, as an early objective, the overcoming of any holdover of resentment or contempt toward this type of training generally. And, of course, the only way to sell any safety training program to the employee is by dem-

onstrating to him that tangible results in rates of injuries are being achieved since the inception of the program.

It would be nice if adequate accident prevention could be attained by lecturing employees on unsafe working practices, by the display of horrendous posters and by forever seeking to affix the blame for past accidents on some luckless individual. Such a program is a cinch to install and calls for little effort to keep rolling along. Accident prevention would be no problem at all



"... this bored fellow ... needs most to have his work habits or driving habits improved."

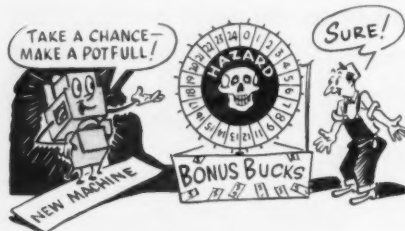
if people would just listen and profit from a good inspirational lecture.

Lecturing on safety is a carryover from the college classroom, where so very much valuable information is passed on to the students verbally. But of all the methods of instruction that may be employed in *industrial* training (lecture, demonstration, discussion, illustration, visual and experiment) lecture by itself gets the poorest results.

If the safety program is found wanting in terms of the yardstick, any attempt to overhaul it must concern itself with the three major divisions of industrial accident-prevention activity. These are, of course, (1) development and instal-

lation of machine safeguards and other mechanical protection; (2) the organization of plant safety committees; and (3) formal training courses in accident prevention. Let's consider each of these, in turn.

(1) Observation leads me to believe that this division (mechanical protection) of accident prevention in industry is at present the most effective and efficiently organized of any. There are exceptions, but in general excellent progress has been



"... new machines ... present hazards that would be immediately apparent only to the employee directly concerned with getting out production."

made in eliminating hazards by mechanical means.

One reason for this is that safety engineers often are recruited from the ranks of mechanical engineers, and their natural approach to the discharge of this responsibility is a detailed study of those machines that might otherwise injure workers. Insofar as accidents can be prevented by mechanical means, this has, in most instances, been taken care of.

Furthermore, because of this natural approach by the engineer, a considerable body of knowledge has been amassed—much of it developed by empirical method—all of which is available in convenient form to

the newly appointed safety engineer. The same thing applies to methods and general procedure in first aid—which activity, however, should never be confused with accident prevention.

Therefore, except in unusual instances, examination of the mechanical safeguards throughout any plant almost certainly will prove this situation to be well in hand. Wherever laxness in this respect is uncovered, the oversight may be remedied with a minimum of time and effort.

(2) Experience has proved that the employee safety committee has but a single legitimate, useful function. This is for the members from the various departments to assist the safety engineer by spotting mechanical hazards not yet properly safeguarded and reporting these to him. In this capacity the safety committee members perform a valuable service. *In particular, new machines and new operations may present hazards that would be immediately apparent only to the employee directly concerned with getting out production.*

The difficulties encountered in the functioning of safety committees always manifest themselves after their scope has been broadened until the members are encouraged to study the work habits of their fellow employees and report on these to someone outside the department. Or, in more extreme instances, a safety committee may be further empowered to analyze lost-time injuries and affix blame for these.

I suppose if we really concentrated on the matter it would be difficult to devise two methods more

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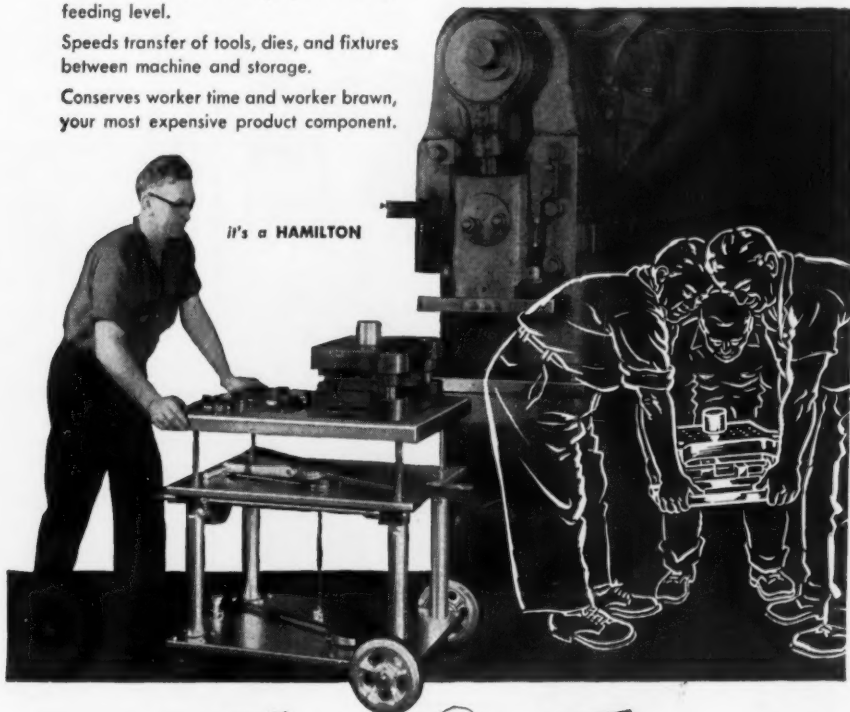
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sure-fire than these as creators of dissension. Any plan that sets up one group of workers as spotters on the action of another group is pure dynamite. And affixing blame for accidents, when this is essential, can be properly carried out only by a group of seasoned supervisors meeting with the safety engineer.

As a matter of fact, too much time often is consumed in this dead-horse

business of affixing blame for past accidents—time that could be better spent in preventing accidents from occurring. Besides wasting time, such autopsies often create bitter feeling, and this without performing any real service in preventing future injuries.

Any approach to accident prevention that is based primarily on punishment coupled with espionage will

not prove very effective. Not only does this sort of thing fail to cut accident rates, but it creates much unnecessary dissatisfaction among the members of the supervisory force as well as the employees. And when the supervisors are not solidly behind any safety program, those administering it are in real trouble.

By all means confine the activity of the safety committee members to searching out and reporting on unsafe mechanical conditions in their departments.

(3) There are many fine train-

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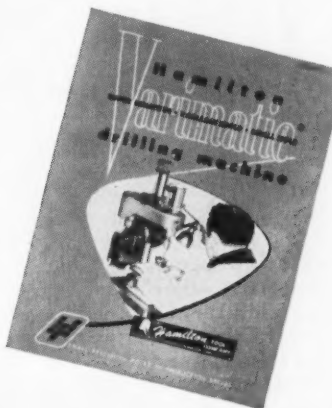
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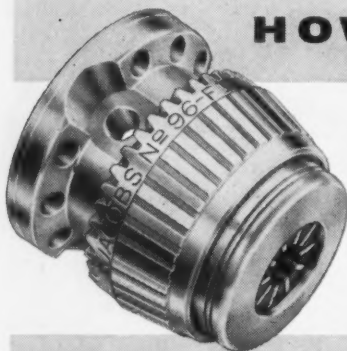
ing programs in accident prevention in effect within our industries. The best and most effective of these may well utilize the conference method as an instructional device, either in whole or in part, for keeping the worker safety-conscious throughout the day.

Properly carried on, conference discussion of safety problems has two important advantages over old-

er methods of training in accident prevention. First, participation in such discussions is interesting and enjoyable, thus promoting real thought and securing adequate carryover to the job. Second, there is never any occasion for putting any individual on the spot, and this keeps the student from assuming a defensive attitude.

The result here is a superior atmosphere in which to carry on training. Where there is no boredom, no resentment, no recrimination or bitterness, the instructor has a minimum of antagonism to overcome. There is no reason why any instructional process cannot be thoroughly enjoyable to the person who is learning.

This is one reason why the administrator of a conference safety training program can achieve results difficult to approximate by other means. Directing a conference program is always more difficult than preparing lectures, but the director



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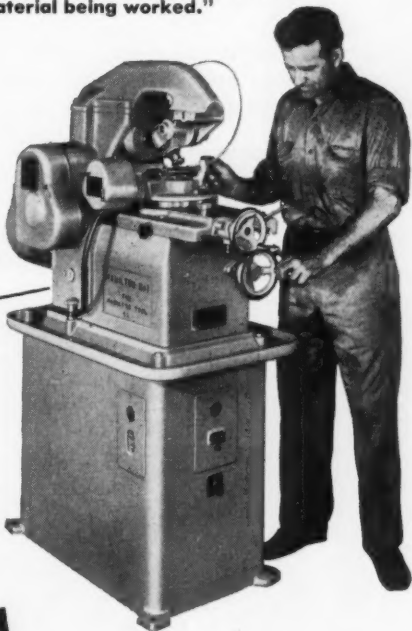
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is richly repaid for the additional effort.

But the conferences in such a program must be properly planned and conducted if real progress is to be made in reducing frequency and severity rates. It is not enough to schedule meetings and thereafter lead rambling discussions. In every instance in which I have known of a conference program failing to get results, the meetings were improperly planned or poorly conducted.

A conference training program may be satisfactorily carried on by members of the plant training division, provided these instructors have been carefully trained as conference leaders. Because of the unique relationship existing between the industrial supervisor and his own subordinates, it has also been found al-

together practicable to utilize these boss men as conference leaders in such a safety training program. When this can be done training costs may be reduced to a minimum, yet the individual supervisor devotes but three or four hours monthly to this activity.

But here again, the supervisor must really develop into an effective leader of discussion if worthwhile results are to be attained. Fortunately, foremen and their assistants take naturally to discussion leading, whereas some of them might experience difficulty in delivering a series of lectures. The effective conference leader asks questions, and thereafter for the most part keeps his mouth shut, thus encouraging group members to talk.

Rather than put supervisors



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through a formal course of training in conference management before beginning the safety training, it has been found preferable to permit them to sit in demonstration conferences, after which they have little difficulty conducting identical conferences with their own subordinates. In this so-called rehearsal meeting the administrator of the program leads a safety conference in which the supervisors sit as partici-



"... it is surprising how quickly the supervisor's leadership technique improves and ... how quickly the severity and frequency rates in that division take a sharp tumble."

pants, at which time they also study the methods employed by the director in promoting and directing discussion. Then the conference is discussed; each supervisor is furnished with a detailed conference plan for the meeting he is to lead and is asked to conduct one or two similar meetings with those reporting to him during the ensuing month.

Thus, the supervisor learns to lead conferences through previous participation in conferences. A sampling of his meetings are observed by a trained critic, following which written critical reports are submitted to him. *In this manner it is surprising how quickly the supervisor's leadership technique improves and (what*

is more to the point) how quickly the severity and frequency rates in that division take a sharp tumble.

Supervisors enjoy training their own subordinates and appreciate that this is one of the responsibilities of any boss. At first some of them may feel somewhat diffident about tackling anything as novel as leading training conferences. However, this attitude is apparently only at the opening of such a training program in a particular plant. Very soon these men get the swing of it and after that there is no further hesitancy. In many years I have encountered but one supervisor who simply could not get the hang of leading resultful conferences. The truth is, the essential characteristics of a good boss and those of a good conference leader are identical.

A further advantage of using supervisors as instructors lies in the fact that these bosses are in a better position than anyone else to see to it that the conclusions reached by the employees in conference actually are put into practice on the job. Nevertheless, this type of safety training can be just as effective if it is considered advisable to utilize only full-time instructors from the training division to lead the conferences. The method of procedure is similar and the course content is identical. The costs will, of course, be higher.

In earlier issues of MODERN MACHINE SHOP I have written in some detail, regarding both this method of procedure and the manner in which sure-fire thought-provoking discussion questions relating to the various phases of accident pre-

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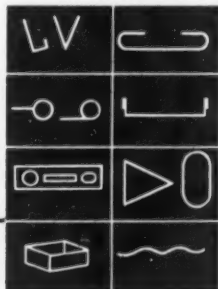
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vention may be developed. Here it will be necessary to review these matters but briefly.

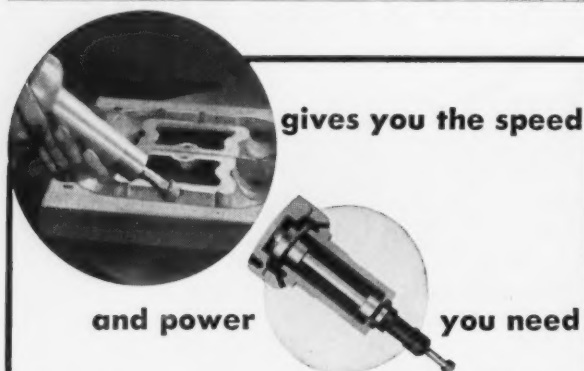
1. In the opening conference with the employees the leader develops from the group a blackboard list of the underlying causes of accidents in that department and then has the group arrange these in an order of importance as causes of accidents.

With but little confusion the group soon learns to distinguish between underlying causes and superficial causes, and anyone who has not before witnessed this development may well be surprised at the grasp of the subject shown by the employees. It is at once obvious that each man present has already given considerable thought to causes of accidents.

Properly carried out, this discussion takes up the hour and a half usually allotted to these meetings.

As an opening session, this meeting gives the employees a good grounding in underlying causes (without lecture), automatically develops an effective course outline, accustoms those present to participation in group discussion, and also may give the leader needed insight into the amazing results to be obtained by pooling the ideas expressed by twenty to thirty people.

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going first round of meetings, thus limited as to attendance, probably necessitates holding 20 to 30 conferences. The order of importance developed usually varies somewhat in the various groups, and the program administrator (usually the educational director or safety engineer) "boils down" these group findings and comes up with a master list of underlying causes. This consensus is issued to each employee at the opening of the second round of meet-



"... negligence nearly always lands in first place."

ings, with a brief explanation by the leader as to the manner in which it was arrived.

Now the groups are ready to begin discussion of the No. 1 cause of accidents in that department — *negligence nearly always lands in first place*. It is logical to attack this primary cause of accidents first, and, because of its importance, two conferences may be required to complete discussion on this subject.

The administrator has prepared perhaps half a dozen discussion questions dealing with the subject of *negligence*, even though he knows discussion of but three or four good questions will fill the period. The leaders like to have a few questions in reserve.

It should be obvious that the wording of these discussion questions may well be a determining factor in the success of this type of training program. Care should be exercised in their preparation, and the administrator must know which questions serve to arouse the highest degree of interest in the average group. This knowledge is helpful in preparing questions for following meetings. Don't rehash ancient accidents as a basis for such questions if there is any chance the groups will recognize the specific case involved. Aim to keep the questions and the discussion objective.

Attendance by the individual employee at a conference a month may appear scanty enough in any training program, but if each meeting is carefully planned and fairly well conducted it will be found that the carryover from the safety discussions is surprisingly lasting, and the desired effect of keeping the employees thinking safety all day and every day is readily achieved. Quite often certain of the discussions will be continued on the job by the employees for some time, and this is an excellent thing, not only as an indication of the degree of interest aroused at the last meeting, but as an assurance of interest at the opening of the next one. You will hear no "ho-hums" at this meeting.

As early as immediately following the second conference of the series, if the program is properly functioning, a check will reveal a marked reduction in frequency and severity rates. That's fast work, but it is only the beginning.

3. You now have subject matter for at least a two-winter series of

conferences, and so long as the discussion questions are thought-provoking there will occur no drop in group interest as the conferences continue. If advisable, two conferences each may be devoted to the three top underlying causes, and one each to those of lesser importance. After a year, a review conference on any of these may well be in order.

A typical order of importance (and thus rough outline) may read like this: *negligence, haste, improper supervision, worry, ignorance, overconfidence, fear, disobedience of orders, physical defects, lack of emotional control, recklessness, horseplay, misunderstanding of orders and defective equipment.* Even these 14 underlying causes (and there may well be 40) will furnish subjects for many interesting discussions.

If production supervisors lead the conference with their own subordi-

nates it will be found that each conference is better conducted than the one before. This is gratifying, and it is also helpful should the subject matter in later conferences present increased difficulties in presentation.

In general, the training program should be considered as being on trial for six months. At the end of that period a substantial reduction in frequency and severity rates

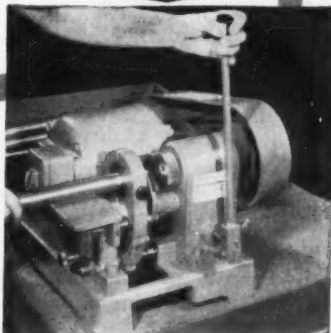
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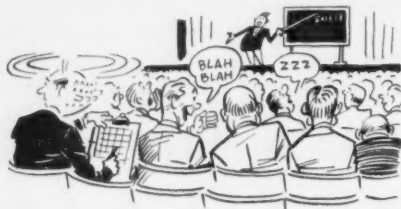


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should be evidenced. Otherwise, this yardstick will indicate there has been something wrong with the preparation of the material and its presentation to the groups. *In particular, the critical observer must*



"... the critical observer must be forever alert to the degree of interest evidenced by the employees in the discussions."

be forever alert to the degree of interest evidenced by the employees in the discussions. Interest results directly in carryover to the job. When I attend meetings as an observer I like to estimate the degree of interest evidenced at five-minute intervals, on a scale of 0 to 100.

It is believed that any attention paid to the three groups of suggestions set forth earlier (checking the efficiency of mechanical safeguards, scrutinizing the safety committee setup, and the installation of an effective training program in accident prevention) will remove any lost motion that may have crept into the safety program as a whole. Since, of these three approaches, the training program may offer the best possibility of improving employee attitude toward safety, it is believed that an overhaul and streamlining of training procedure may well produce the most dramatic results in reducing severity and fre-

quency rates of injuries to employees.

When it has been determined to utilize the conference method in safety training, stick to directed discussion all the way. Do not intersperse lecture and discussion, and forever bear in mind that a question-and-answer forum, with the instructor answering the group's questions, is the direct antithesis of conference discussion where the leader asks, and the group answers, the questions.

Accident prevention is essentially a human-factor problem, and I know of nothing more intensely human than a redhot discussion of a safety problem, participated in by a group of industrial employees—men whose very lives may well depend upon their solution of that problem.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



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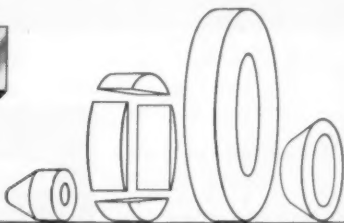
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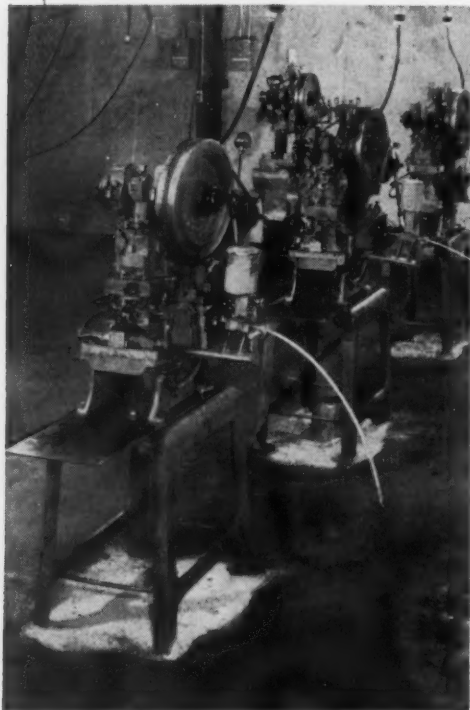
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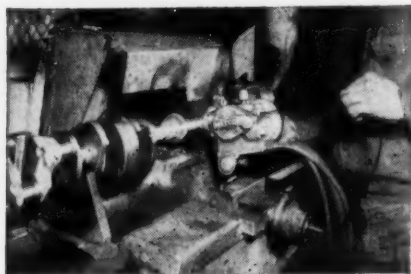
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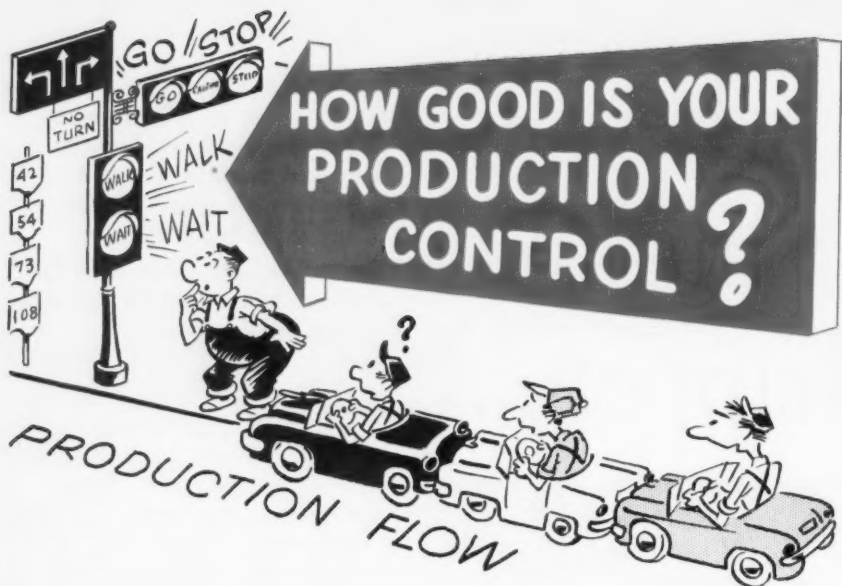


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Efficient production demands periodic evaluation of the area of responsibility assigned to Production Control personnel.

By CHARLES A. KOEPKE

PRODUCTION Control may be defined as the coordination of a series of functions designed to control an orderly flow of materials and parts through their purchasing and manufacturing cycles at a predetermined rate with a minimum of men, machinery and cost. This definition is a general statement which allows a lot of latitude in setting up and maintaining an adequate control system. Another way to define the prime purpose of production control is to develop the simplest possible way to

**KNOW WHAT YOU HAVE
KNOW WHAT YOU NEED
GET OR GET RID OF—
THE DIFFERENCE.**

This short concise definition of Production Control was borrowed from the Ford Motor Company several years ago and it is difficult to state the problem more clearly.

All plants control their operations more or less. This may vary from a slipshod part time activity to others where overcontrol with too many forms and procedures are used in an

effort to solve the problem. The old style shop is almost extinct, where the foreman, aided by his clerks and mechanics, ordered materials, planned and scheduled the shop operations. However, at the other extreme, overcontrol tends to be a form of creeping sickness which often develops from inadequate analysis of the problems as they arise. Devising a new form or adding another expedient may hide the symptoms, but a thorough analysis of the problem to find and remove the fundamental troubles is much more effective and less expensive. Production Control should be considerably more than a series of defined blank spaces and columns which may be purchased from most any printer of business forms. The more pages and columns there are to be posted, analyzed and orders written, the more clerks the system requires. As the paper work grows and grows, the punched card and mechanization take over the

and try to plan around them. This may be the easy lazy way but it also may be the cumbersome expensive way to control a complicated manufacturing plant.

Production Control, through its



"... excess paper work is often the result of insufficient study and analysis by the managers of production control."



KNOW WHAT YOU HAVE
KNOW WHAT YOU NEED

GET OR GET RID OF
— THE DIFFERENCE

"... the prime purpose of production control is to ... know what you have, know what you need, and get or get rid of the difference."

load. *This pattern of excess paper work is often the result of insufficient study and analysis by the managers of production control.* There is a tendency to accept overall conditions in the plant as they now exist

analytical group, should originate and suggest positive corrective actions to develop and promote the most favorable climate for lowering factory costs. Such suggestions might be directed toward designers, methods engineers, production executives, inspectors or quality control, storekeepers, purchasing and accountants. In other words, across-the-board, because anyone of this group can and has been responsible for higher than necessary production costs.

This manner of speaking does not mean that the production control manager is to be a super boss man who assumes the duties of a V. P. in charge of engineering and manufacturing. It does imply, however, that he is in a position to analyze production bottlenecks, determine

the cause and keep *his* supervisors informed of possible ways to correct the trouble.

For example, design engineers usually are highly intelligent, self sufficient individualists. They tend to come to their own conclusions concerning the type of information which should be included in their part lists and prints. Tolerances for the same class of fit are sometimes



"The methods engineer may accept a design . . . to prove that he is ingenious . . ."

inconsistent and cost more than necessary because the tolerances are not specified properly. Piece parts should be designed so they can be economically produced. Some designers fail to furnish complete part lists. Some leave out the washers, nuts and cotter pins, or they fail to give a part number to a subassembly which must be stored, costed and even sold for repairs.

Methods engineers sometimes tend to overlook their prime responsibility which is to set up the most economical methods to produce parts and devices assigned to them. Furthermore, parts and assemblies should be critically examined *before* any method of manufacture is actually devised. Close tolerances, diffi-

cult contours, methods of assembly and non-standard materials must be suspected until found necessary. *The methods engineer may accept a design because it provides him a chance to prove that he is ingenious and can find a way to make the difficult part.* However, if someone else asks a few questions concerning the design which might relax the tolerances or allow a cheaper material or method of assembly, the methods engineer may find that his acceptance should come only after a careful study of the design.

One could go on and cite actual examples for each of the groups mentioned above, but accountants probably would be seldom charged with raising the cost of production. An actual case history analysis in a large plant showed that the excessive percentage of setup time for the spring winding department used up about 50 per cent of its production capacity. This was caused by a decree from accounting that no production lot could be larger than required for a three months' inventory. When the economic lot principle was adopted, it was found that the lot size for a certain spring was enough for a seven years' supply. Accounting literally hit the ceiling. However, the setup cost was very high, the material cost and winding time per spring were very low and the monthly usage also was low but necessary. Even if the spring had been declared obsolete at any time the total loss would have been under \$20.00 for the scrapped material and labor. Blanket rules usually should be analyzed to find if they cause higher manufacturing costs. Economic lot sizes in this spring depart-

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ment increased the department's capacity by reducing the setup time from about 50 to 20 per cent.

If Production Control management does assume the responsibility of analyzing situations which cause higher than necessary production costs, they should also examine their own operations. Check the number of people used by Production Control. This should include all the



"... excess setups rob a plant of vital capacity . . . until someone makes an analysis to find what causes the condition."

clerical personnel used to post the records, write production orders and purchase requisitions. Include all coordinators, chasers, expeditors or whatever term is currently used to name this group of eager beavers. If any records are posted to charts or other graphic devices, include the people performing these duties in the total. Any dispatchers for distributing the work load within each department should also be included. Unless some of the stockroom attendants have been used or hired to provide additional information and service for the Production Control function, they should not be included for this calculation.

If the total Production Control personnel, as included above, is more than four or five per cent of the total number of all direct factory workers serviced by Production Control, you may be overcontrolled. This excess personnel sometimes results from expeditors expediting other expeditors who in turn get foremen to shut down operations on one part to take on operations for another part. In fact, many cases are on record where up to half of the capacity of departments for first operations were absorbed by changing setups. *These excess setups rob a plant of vital capacity in a very subtle way until someone makes an analysis to find what causes the condition.* Such studies carried on by possibly one keen analytical thinker in Production Control can increase shop capacity and decrease the number of Production Control personnel.

The principle of economic lot sizes can be used as a guide to obtain lower production costs. The excessive costs of short runs are clearly pointed out when economic lot sizes are used. The increase in the productive capacity of the machines by actually using them for producing parts instead of being down for excessive setups is a real gain.

This short article on Production Control has been purposely slanted toward a plea for critical examination of an important function in modern industry. Production Control managers should study, analyze and become critical of their own operating functions. Can they use economic lot sizes to reduce costs; are they tending toward more simple or more complicated records and procedures to control the productive

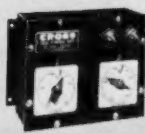
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flow through the plant; do production supervisors respect and understand the system and do they cooperate with the various control?

If this article hits a responsive chord we hope to have a series of articles on the various phases of Production Control, such as economic lot sizes, plant capacity, machine loads, inventory control and other pertinent subjects. A question and answer page is contemplated where readers can vent their gripes or ask pertinent questions on this subject. We will not know all of the answers but if we cannot answer them we will submit them to our readers for possible answers. Send any communications to the Editor, "Modern Machine Shop," 431 Main St., Cincinnati 2, Ohio.

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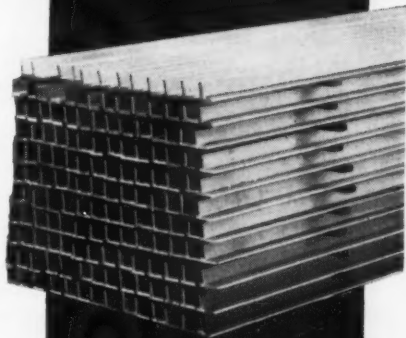
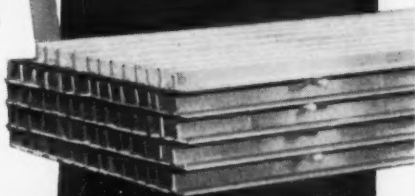
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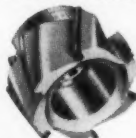
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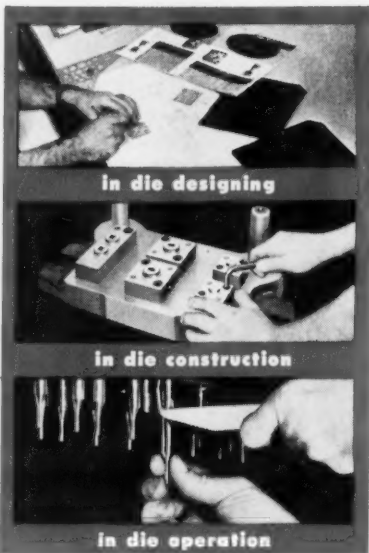


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Drilling Cross Holes In Shafts

By F. E. RILEY

The cross-hole drilling jig described can be used for drilling 14 different hole diameters in shafts ranging from $\frac{3}{8}$ to 2 inches in diameter. Suitable for mass or small-lot production, it requires no setting up between jobs.

ONE of the most widely used methods of securing a part to a shaft is by means of a cross hole and pin intersecting the common diameter of the two parts. Cross holes intersecting shaft diameters are also used for lubrication passages, accommodating stop pins, and for housing cotter pins to engage with castellated nuts.

One manufacturer of a line of products, similar in construction but varying widely in size, has to drill cross holes ranging in diameter from $\frac{3}{32}$ inch across $\frac{1}{4}$ -inch diameter shafts up to $\frac{3}{8}$ inch across shafts of 2 inches in diameter. The cross-hole diameter range includes 14 different sizes. To provide separate jigs for the full range of shaft and hole sizes would result in a heavy expenditure and would require a considerable amount of storage space, no matter how simple the design of the jigs.

Initially, it was decided to design a few jigs, each one adaptable for a limited range of shaft and hole diameters. This idea was rejected eventually in favor of one jig which

would accommodate the complete range of parts. It might be well to mention that the batches of similar parts processed at one time rarely exceeded 100 per week, so that one jig would not be engaged for a long period when drilling any particular batch of parts. It was found that the one jig could adequately meet the complete production requirements; therefore, the final design was pushed to completion, evolving in the type of jig shown in the accompanying drawing.

Three views of the jig are shown in the drawing, and it will be noted that the heart of the unit consists of a work holder for gripping the shafts, the holder being in the form of a self-centering three-jaw chuck. The chuck is of standard design except for the jaws which are made from soft steel blanks available from most chuck manufacturers. The soft jaws are ordinarily supplied for second-operation chucking and can be machined to any required shape by the user.

In the jig shown, the jaw blanks

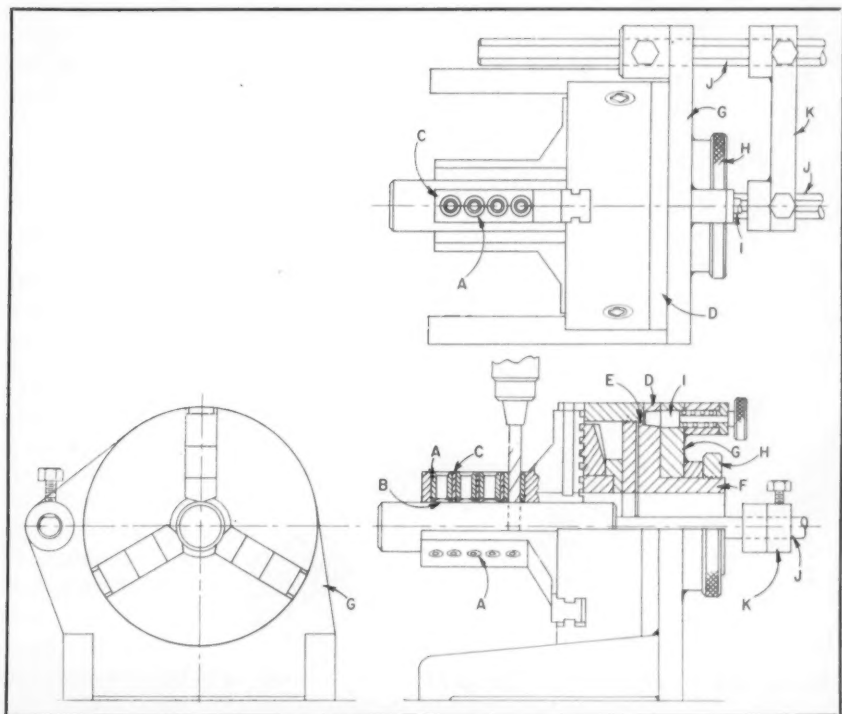
were band-sawed to shape and then jig-bored to accommodate the pressed-in drill guide bushings *A*. After case-hardening, the gripping surfaces at the jaw inner ends were ground so that they gripped the work concentrically with the axis of the chuck body. Since each jaw moves radially in the chuck body, the center lines of the drill bushings inserted in the jaws will intersect the axis of any diameter shaft which is held in the jaws; therefore, any drill fed through a bushing will automatically travel along the true diameter of the work and a centrally-located

cross hole will thus be produced.

The holes for the drill bushings break up the gripping surfaces of the jaws, as shown at *B*. However, this is not a serious detriment inasmuch as the jaws do not have to grip the work tightly; they merely centralize it in relation to the bushings. The work is not subjected to any torsional stress; therefore, the jaw pressure need not be heavy.

In all, there is a total of 14 bushings, each of a different drill diameter, distributed between the three jaws. The jaw *C*, shown in section, accommodates four bushings, the

Drawing showing three views of jig for use in drilling 14 different hole diameters in shafts ranging from $\frac{3}{8}$ to 2 inches in diameter.



largest bore of which is for a $\frac{3}{8}$ -inch drill. The other two jaws each have five bushings, the smallest of which is for a $\frac{3}{32}$ -inch diameter drill. Smaller drill sizes enable smaller bushings to be used so that more bushings can be inserted into a given jaw length.

The chuck is fastened to a back plate, *D*, with proper location assur-

ed through the registering surface *E* provided for engagement with the recess in the back of the chuck body. The horizontally situated boss *F* is integral with the chuck back plate, and its outside diameter is a close rotating fit within the mating bore of the jig body *G*. The adjusting nut *H* for taking up endwise slack engages with the threads on the end of

the boss *F* can be locked at any desired setting by means of a headless set screw passing radially through the wall of the boss.

Each jaw on the chuck can be adjusted for lining up any group of bushings with the drilling machine spindle axis. Positive location of the chuck for this purpose is obtained by three equally spaced tapered locating holes machined in the back face of the chuck back plate. A spring-loaded taper indexing pin, *I*, is arranged so that it can be engaged with any one of the three holes in the back plate. With this



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arrangement, the change from one hole size to another requires only a matter of seconds.

The jig body *G* comprises a vertical steel plate with a pair of horizontally projecting feet welded to it. The undersides of the feet have clearance spaces cut therein in order to reduce the area of contact between them and the drill press table.

On repetitive work, it is necessary to be able to position cross holes accurately with one of the shaft ends, and, for this purpose, work-locating means are provided in the form of a pair of round bars, *J*, one located outside the jig and the other in line with the workpiece axis. The bars are connected together by means of the link *K*. This arrangement al-

lows the bars to be adjusted independently of one another to suit both long and short workpieces. Long pieces which extend from the back of the jig for a considerable distance may tend to tip the entire assembly backward. In such instances, the jig feet are bolted to the drill press table and a stop is fastened to the drill press table a suitable distance away.

Apart from production work, a jig of this type should also prove to be useful for drilling cross holes either in toolrooms or in general engineering type work.

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By GILBERT C. CLOSE

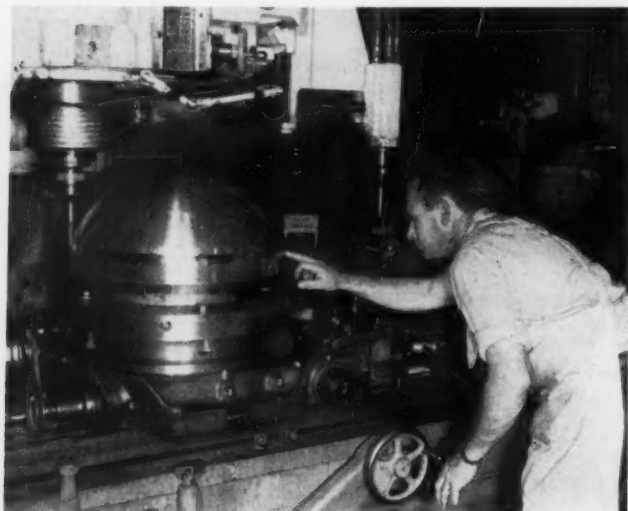
Perfect semi-sphere is produced from large steel billet with three-dimensional milling techniques.

FACED with the problem of producing a perfect semi-spherical shaped solid tool for plastic molding work from a steel billet 2 ft. square x 12 in. thick, shop men at Northrop Aircraft, Inc., decided to use three-dimensional milling techniques. The accompanying illustrations show how the job was accom-

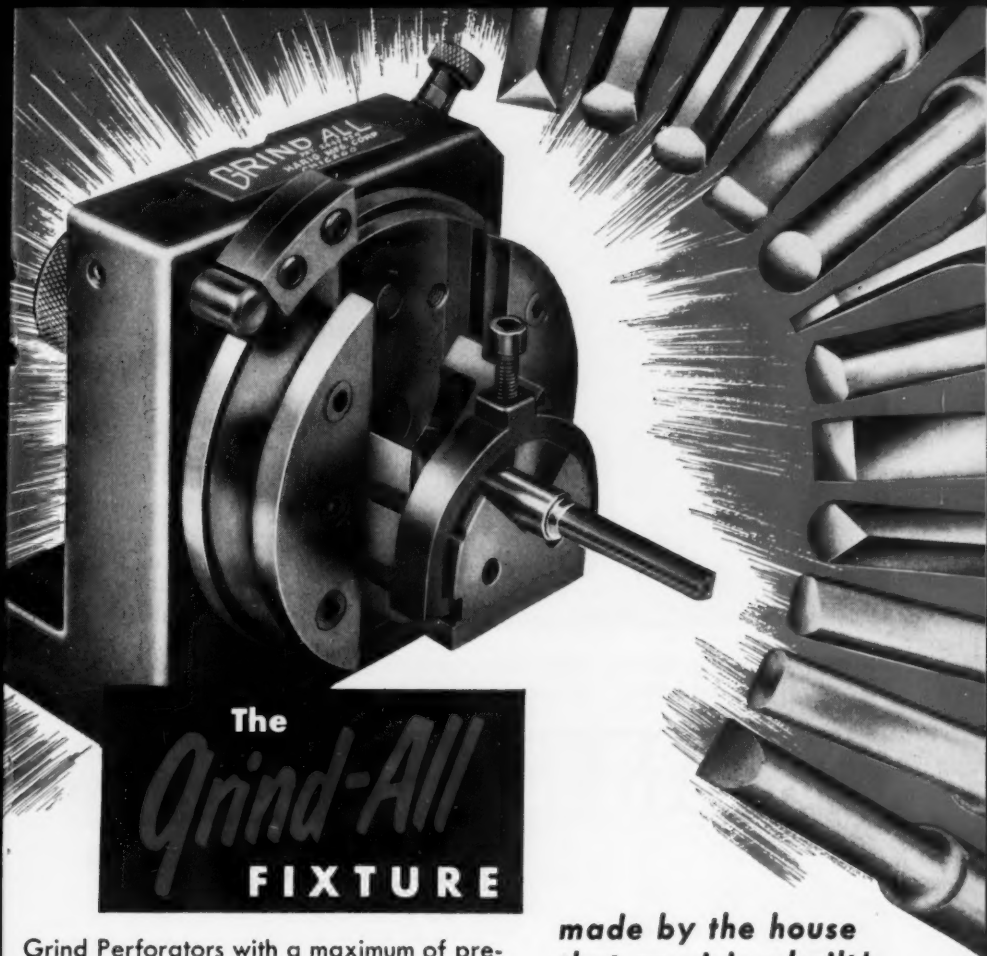
plished in the final stages. The billet was first roughed to an oversize shape on a vertical boring mill. The final contour was applied using a Cincinnati Hydrotel tooled with a 1-in. end mill.

A multiple-use turntable was first mounted on the Hydrotel bed, along with a $\frac{3}{4}$ h.p. motor. The motor was

connected to the turntable through a series of step-down V-pulleys and belts so that turntable speed would be approximately two revo-



View from left side of setup, showing step-down pulleys that gear motor (not visible) to multiple-use turntable mounted on Hydrotel bed. Turntable speed during milling was 2 r.p.m. The 1-in. end mill is shown lowered into the work.



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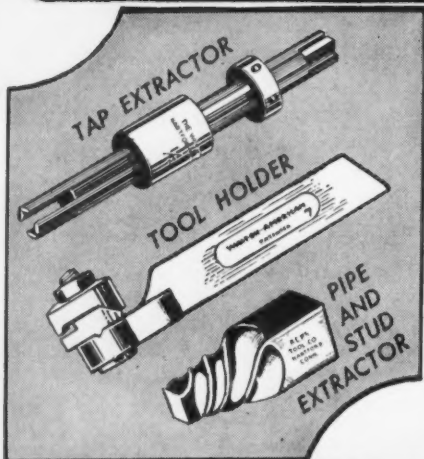
View from right-hand side of setup, showing the pattern used and the tracer acting against the pattern to provide single-plane Hydrotel head travel. The third dimensional effect was produced by revolving the work under the pattern-controlled cutter.

properly contoured pattern and with the turntable rotating the semi-sphere under the end mill cutter, the milling operation was com-

pletions a minute. Then, with the Hydrotel tracer acting against a

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
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ideas from readers

Plug Gages Made from Discarded Ball Bearings

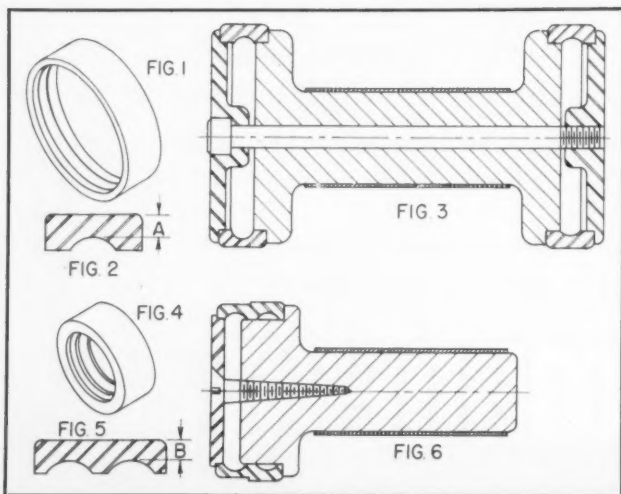
By FRED ROGERS

A "GO and no go" plug gage was required on short order with no tool steel available of the size needed. The two diameters were to be 3.5010 and 3.4970 inches. Having some used and worn-out ball bearings on hand, it was decided to investigate the possibilities of using the outer ring, as shown in Fig. 1 of the accompanying

sketch, for the gages. A No. 210 single-row bearing is 3.5433 inches on the o.d. Upon measuring the ring, it was found that the thickness of metal **A** at the race, Fig. 2, was 0.175 inch. Sufficient thickness remained after grinding the diameter from 3.5433 inches down to 3.5010 inches so that the strength of the ring was not sacrificed. This meant taking off only 0.042 inch on the diameter or 0.021 inch per side, leaving approximately 0.154 inch between the ball groove or race

and the outside diameter of the ring.

Chucking the ring on the inside, the 0.021 inch was removed, using a copious flow of coolant so as not to draw the temper. Inasmuch as the hardness of the metal registered Rockwell 65



Sketch showing how plug gages can be readily made from discarded ball bearings

C scale, wear would not be a factor to consider. The radius on each face, originally about 3/64 inch, was touched up again after the o.d. was ground to the required size.

The pattern shop turned up a piece of baywood or patternmaker's mahogany to the shape illustrated in Fig. 3. The space between the two flanges was made 3 3/4 inches, long enough for a man's hand. The shouldered diameter of the flange was turned to a snug fit for the bore of the bearing ring. The two retaining washers were made of ordinary machinery steel. The shoulder also had a snug fit in the ring. One washer was counterbored and the other tapped for a 3/8-inch socket head cap screw which measures 6 inches long.

To simulate knurling, a piece of emery cloth was carefully cut to the circumference of the 1 1/2-inch diameter handle so the edges did not overlap. This cloth was then hot glued to the handle and taped until the glue set. Although the cloth was not too coarse, it made a very satisfactory "knurled" type handle.

This gage was found to be very satisfactory. It was much lighter in weight than a solid one and did not have to be hogged out of solid stock. A heat-treating operation was not necessary. At first it was only considered a temporary gage, but it gave good service over a long period.

When a smaller "go and no go" gage was required, one having diameters of 2.7505 and 2.7485 inches, only



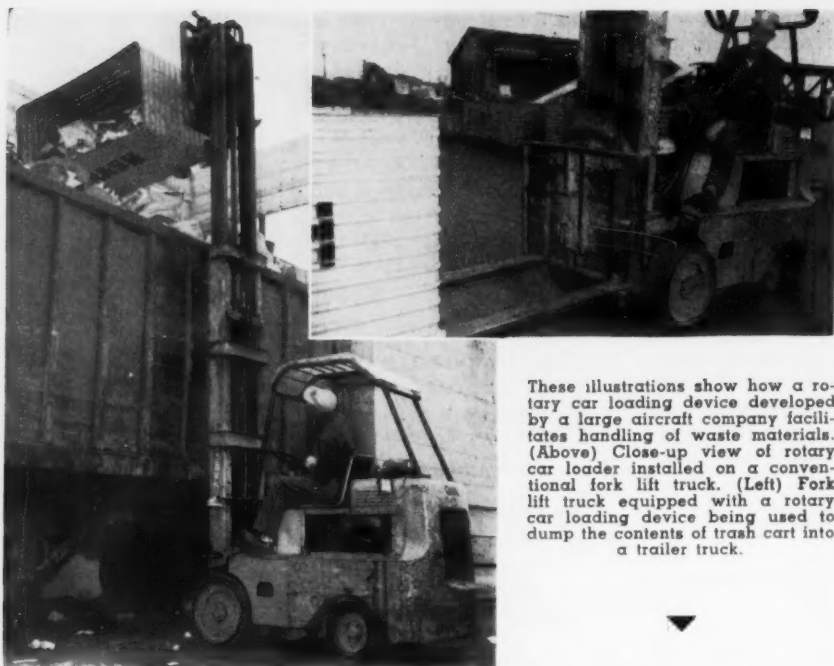
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These illustrations show how a rotary car loading device developed by a large aircraft company facilitates handling of waste materials. (Above) Close-up view of rotary car loader installed on a conventional fork lift truck. (Left) Fork lift truck equipped with a rotary car loading device being used to dump the contents of trash cart into a trailer truck.

a double-row bearing was on hand. This bearing was a No. 207, having an outside diameter of 2.8346 inches, as shown in Fig. 4. In this instance, approximately 0.042 inch had to be removed per side. This left nearly 9/64 inch of metal at **B**, Fig. 5, which was considered to be sufficient for strength.

The width of this bearing is $1\frac{1}{8}$ inches; therefore, it was decided to grind both diameters on the one ring and make a single-end gage of it as shown in Fig. 6. The handle part was made of the same material with an emery-cloth "knurl" as the larger gage previously described. The retaining washer was drilled and countersunk to accommodate a wood screw as shown. In both cases, the sizes were "etched" on the faces of the washers with the aid of an electric pencil.

Rotary Car Loader

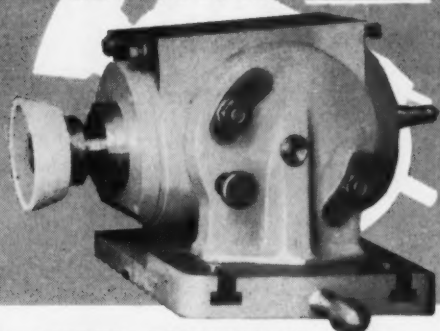
By IRA S. ROBERTS

A ROTARY car loader constructed on a conventional fork lift truck, as shown in the accompanying illustrations, has been found to save considerable time in the handling of waste materials at the El Segundo Division of Douglas Aircraft Company. With this equipment, one operator can dump-load about 40 trash carts an hour. Prior to its development, when a crane was used to hoist the carts for dumping, three men were required to dump-load five trash carts an hour.

The device is a simple permanently mounted, hydraulically operated rotary table that can be actuated in either direction through 360 degrees if necessary. It is mounted on a 4,000 lb. conventional fork lift truck. Each

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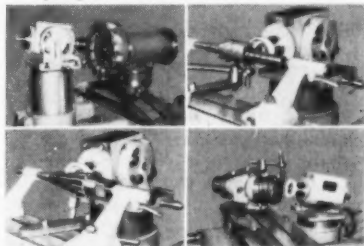
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4. You can read all clearance angles directly in degrees from the scale provided on the head. No more mistakes.
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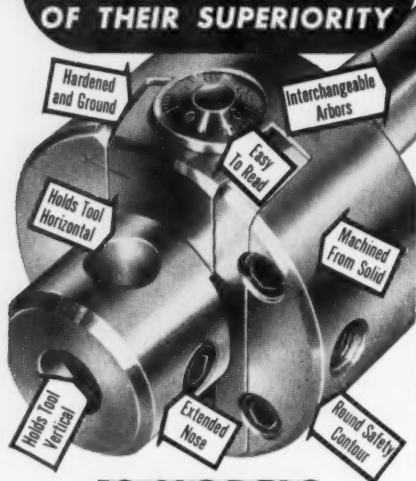
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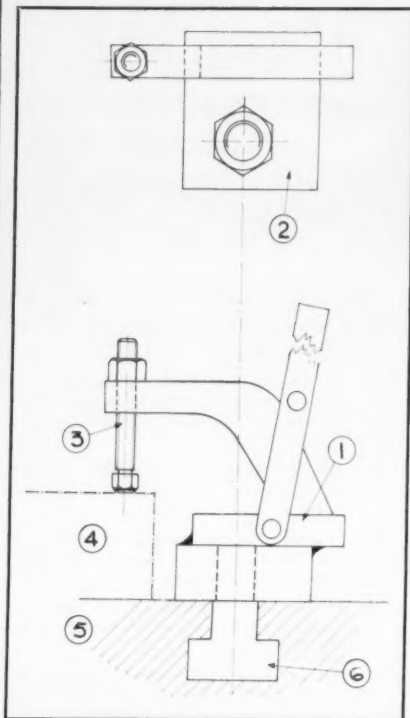
133 FLOWERDALE AVE. • DETROIT 20, MICH.

of the trash carts is provided with enclosed channels into which the forks are inserted. These channels prevent fall-away of the cart when in a tilted or inverted position.

Utility Toggle Clamp

By E. V. LANGE

THE sketch herewith shows a practical utility toggle clamp for slotted machine tables which can be



Sketch of practical utility toggle clamp for holding workpieces, fixtures and "fences" to slotted machine tables

used to hold workpieces to the table, hold fixtures to the table, and hold "fences" to the table. (A fence is an

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alignment bar, along which a fixture or a workpiece can be moved for repositioning purposes.)

To make this clamp, simply select a standard toggle clamp (1) of proper size, function and strength, and weld such a clamp to a block of steel (2). One hole, a T-bolt, a washer and a nut provide for quick fastening of this clamping device to a slotted table (5). Clamps of this type are especially helpful in cases where fixtures (4)

have to be repositioned and fastened in the course of one operation. The toggle clamp itself can be readjusted for various fixture heights with the help of a screw (3). (6) denotes the table slot.

Chamfering Guide for Routers

By WILLIAM CHILDRESS

TEMCO Aircraft Corporation has adapted its ½-in. air routers for chamfering by adding 1 x 2-in. notched steel guides to the ends of the routers. These guides are expected to save \$3,000 annually in man-hours that normally would be spent hand-filing chamfers on certain aircraft parts.

Developed for use on any standard Quackenbush or Onsrud router, the chamfer guide is designed to rout a 45-degree chamfer. To obtain the desired angle, a 90-degree triangular notch is milled in one side of the guide block. The notch is at 45 degrees to the router blade which passes through a hole bored in the center of the block. The blade is exposed where it intersects the point of the triangular notch. As shown in the accompanying illustration, the hole that encloses the blade is adapted in such a manner that the guide can be screwed onto the end of the router.



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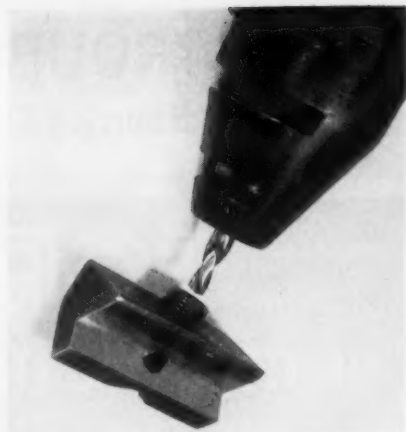
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Chamfer guide is shown beside a Quackenbush air router to which it attaches. When the two are served together, the router blade is slightly exposed by the hole in the notched guide. This allows the blade to cut the desired chamfer on the part against which the guide block is fitted.

By pressing the notch snugly against the edge to be chamfered, the operator is assured a quick and uniform cut. Notches can be cut to provide any chamfer angle, and the depth of chamfer is controlled by the degree to which the router blade is exposed at the point of the notch.



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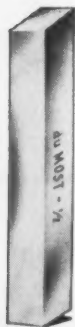
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Institute of Scrap Iron & Steel, Annual Convention, Miami Beach, Fla. Institute headquarters: 1729 H St., N. W., Washington, D. C.

January 10-14

Society of Automotive Engineers, Golden Anniversary Annual Meeting and Engineering Display, Sheraton-Cadillac Hotel and Hotel Statler, Detroit. Society headquarters: 29 W. 39th St., New York, N. Y.

January 12-15

American Supply & Machinery Manufacturers Association, Inc., Regional Meeting, Biloxi, Miss. Association headquarters: 2130 Keith Bldg., Cleveland, Ohio.

January 20-21

Steel Plate Fabricators Association, Annual Meeting, Palmer House, Chicago. Association headquarters: 79 W. Monroe St., Chicago, Ill.

January 21

Malleable Founders' Society, Semi-Annual Meeting, Cleveland Hotel, Cleveland. Society headquarters: Union Commerce Bldg., Cleveland, Ohio.

January 24-25

Industrial Heating Equipment Association, Inc., Annual Meeting, Sheraton-Cadillac Hotel, Detroit. Association headquarters: 412 Fifth St., N. W., Washington, D. C.

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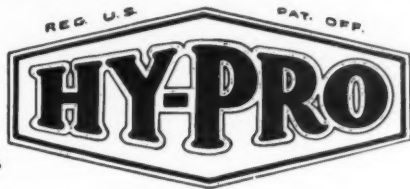
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For wet cutting

Users' reports on how the Norton R50 adds the profit-boosting

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Wheel life tripled — Massachusetts tool manufacturer says R50 wheel, cutting-off high speed steel tap stock, lasted three times as long as best competitive wheel. Job required very smooth cut, with no burr or burn.

Best in every way — Illinois maker of combination doors and windows reports R50 wheel produced best quality cut, fastest cutting action, longest life for cutting extruded aluminum frames.

Longer lasting, superior cutting — Rhode Island oil seal manufacturer reports R50 wheel, cutting-off stainless steel, gave considerably longer life with better quality cut than any other wheel.

70% more durable — New York steel company says R50 wheel beat durability records of two best previous cutting-off wheels by 70%. Work was on high speed and carbon tool steels.

First among four — Pennsylvania manufacturer of coal mine bits reports R50 best wheel used for cutting alloy steel bit stock. Far superior, in quality of cut and durability, to three other wheels tried.

The Norton R50 rubber bonded cut-off wheel is designed especially for wet cutting of ferrous bar stock up to 6" diameter. It is the wheel to use where quality of cut, without burning, is important. Built-in chip clearance — unusual in this type of wheel — is one of many "Touch of Gold" advantages for better cutting performance and longer wheel life.

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For dry cutting

Users' reports on how the Norton B9 adds the profit-boosting

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Five times better — California naval shipyard re-orders B9 wheel for aluminum cutting jobs. Reason: B9's 5 to 1 superiority over best previous wheel.

Best general purpose wheel — Massachusetts manufacturer of molded rubber products reports the B9 best all-around cut-off wheel in their experience. Chief jobs were cutting various types of steel up to 3" diameter.

Unbeatable on Inconel — Pennsylvania bearings company says it found no other wheels to compare with the B9 for cutting Inconel bar stock. Outperformed competitive wheels on all counts.

565 more cuts — Massachusetts manufacturer of textile equipment reports B9 wheel produced 700 cuts on 1 x 1/2 x 1/4" steel channels. This topped previous wheel's record of 135 cuts by 565 — for five times longer wheel life.

The Norton B9 resinoid bonded cut-off wheel is recommended for high production dry cutting jobs, especially where fast rate of cut is essential. It is made with either smooth sides or the rough "F" sides for more clearance in the cut. It will give you long, economical "Touch of Gold" performance in the widest range of ferrous and non-ferrous applications.



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W-1601

January, 1955

MODERN MACHINE SHOP 171

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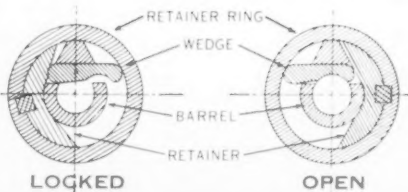
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4. Long-life through elimination of wear areas.
5. Positive wedge type locking of tools.
6. Wedge lock plus Baker drive on larger tools.
7. Simple insertion and removal of tools.
8. Can be used for right or left-hand cutting tools.
9. All tools quickly ground for use in holder.
10. Designed for standard straight shank end mills.

A simple hand spinning of the Wej-Lok retainer ring locks or unlocks inserted tools. Yet, either left or right-hand cutting tools are firmly held by this accurately machined tool holder.

In locked position, the flat surface of holder wedge is tightly seated in mating notched section of tool shank. Normal operating torque tends to further tighten this wedging action, thus, preventing all possibility of tool play or wobble. Where unusually large tools or extra heavy cutting operations are required, provision is made on the holder for use of a Baker drive to augment wedge locking and assure utmost stability.

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Broaching Stellite Turbine Brackets

THE machine shown in Fig. 1 has been designed and built by Detroit Broach Co., Rochester, Mich.,

and specially tooled for broaching four areas on formed Stellite turbine brackets. One of the brackets, prior to the broaching operation, is shown in Fig. 2, along with three views of the workpiece holding blocks into

which the brackets are cast in order to solidly position them during the broaching operation. The casting material used is removed after the broaching operation merely by immersion in hot water.

As shown in Fig. 3, the workpiece during the broaching operation is located in a hydraulically-operated two-station fixture of which there are two. The normal capacity of this

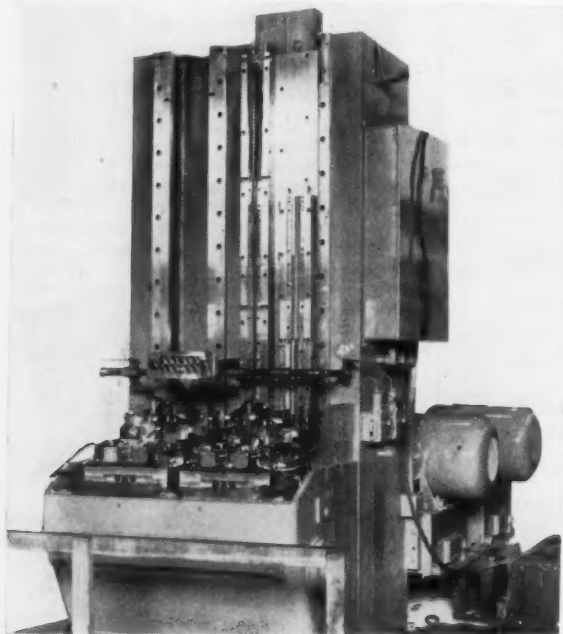


Fig. 1—This 15-ton 100-inch stroke dual ram vertical surface broaching machine is specially tooled for broaching four areas on formed Stellite brackets.

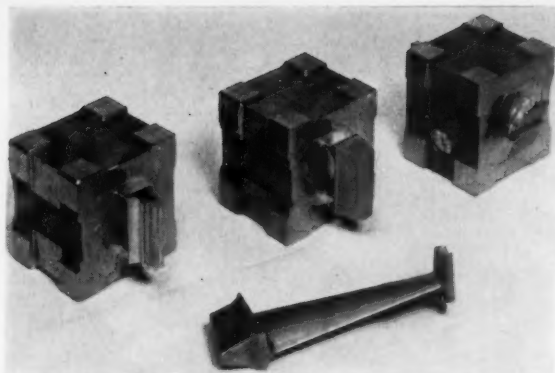


Fig. 2 — This illustration shows one of the Stellite brackets prior to the broaching operation, along with three views of the workpiece holding blocks into which the brackets are cast to solidly position them during the broaching operation.

Oilgear pumps having an oil reservoir capacity of 270 gallons.

15-ton dual-ram type vertical broaching machine is rated at 30,800 pounds pressure with maximum capacity available up to 46,200 pounds pressure. The cutting speed is variable from 8 to 120 ft. per minute with an adjustable stroke of from 12 to 100 inches. The machine is equipped with pre-loaded slides so that the slides operate accurately throughout their entire stroke within 0.0005 inch. Two positive lock shuttle tables, each of which measures 20 in. front to back and 22 in. left to right, are provided. For shuttle table operations, one 5 h.p. motor is provided. The machine itself is powered by means of two 50 h.p. motors, and is equipped with two

Machining Blade Tip Contours of 165-Ton Turbine Propeller Runner

AT the S. Morgan Smith Co., York, Pa., the time required in machining blade tip contours of a 165-ton cast steel propeller runner for a hydraulic turbine was reduced from 220



Fig. 3 — As shown in this view, the workpiece during the broaching operation is located in a hydraulically-operated two-station fixture of which there are two on the machine.

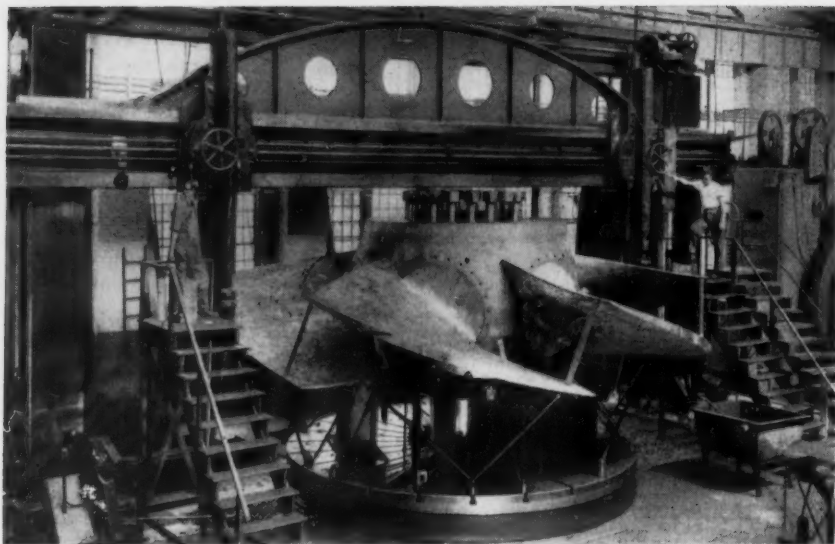


Fig. 1—Overall view of machining setup for turbine runner shows the 165-ton workpiece being machined, with the turntable moving at 2.1 revolutions per minute.

hours to 65 hours by the application of Carboloy grade 370 cemented carbide. The six-bladed runner will provide 111,300 h.p. when installed in its turbine housing at McNary Dam on Oregon's Columbia River.

In addition to size of the workpiece, a number of factors on this job increased the tool engineering problems involved in applying carbides; namely, tough, irregular work material, slight

eccentricities in the casting, a machine that was not new, and the necessity of interrupted cutting. Work was done on a 50 h.p. Sellers boring mill, as shown in Fig. 1, that swings a diameter of 35 ft. 8 inches. The mill has cast iron ways and relatively light vertical rams.

Another difficulty was the work material itself—carbon steel (A 148-50 T, Gr 80-50). Casting gates were burnt



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off with an oxyacetylene torch along the tip of each blade, adding hardened areas and roughness to the cut. Some areas of the blade surfaces are overlaid with 18-8 stainless steel which extends to the tip and becomes part of the peripheral cut. These conditions, together with the usual scale surface, crystallized patches and abrasive spots normally found in very large castings, made the job difficult.

The impact in this interrupted cut-

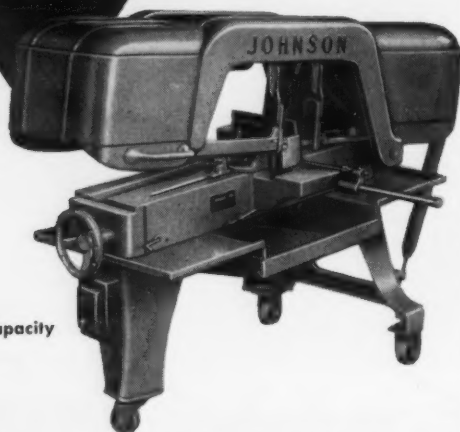
ting was so great that heavy chatter developed because of the "overhang" of nearly 8 ft. from the cross slide to the lower end of the cut. This, of course, produced a wavy line rather than a uniform cut, as shown in Fig. 2. The cut was made at a 1/32-in. feed, at an average depth of 1/8 in., with a maximum depth of 5/8 in., at 2.1 r.p.m. Speed was limited to 2.1 r.p.m. because of the danger of overheating the cast iron ways. Since

the huge runner was 23 ft. 3 in. in diameter, this was a surface speed of 154 s.f.p.m. While the blade tips were only 4 1/2 in. thick at the center, the length of the cut averaged around 10 in. due to the angle at which the blades approached the tool.

The tool was a standard BI-20 turned on its side, so that the 7-degree side relief angle became a 7-degree positive side rake angle and the 15-degree side cutting edge angle became a 15-degree negative back rake angle. The tool was slightly modified by shaping the 1 1/4-inch square shank down to 3/4 x 1 1/8 in. to fit the Armstrong toolholder. Later tools were made up with S.A.E.

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- SPECIAL TOOLS



Fig. 2—Close-up view of tool in the cut shows the wavy-line effect produced by impact and vibration of the tool post. Second roughing pass is being taken here. Note rough chip curling to left from previous cut while hot chip curls from tool at right.

9255 Silman alloy steel shanks for extra strength. The tip, grade 370 manufactured by Carbology Department of General Electric Company, Detroit, was honed heavily at the scale line.

Typical tool wear was a 0.010-in. crater on the top of the tip behind the scale line. This was easily removed on

three times the speed, with less than a dozen stops for regrinding or replacement.

The work was done with carbide tooling in three passes, the first two passes being rough cuts and the final pass a finishing cut. The job was completed by welding cold-rolled stainless plate on the edges.

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All prices are less controls. Any standard controls available for automatic temperature control.

- Cooley modern design provides natural convection—increases uniformity. Heavily insulated large area door makes for low heat loss—reduced power needs.
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Controlling Pyrometers carried in stock—available for all applications.

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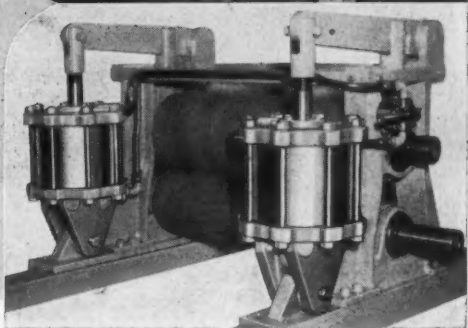
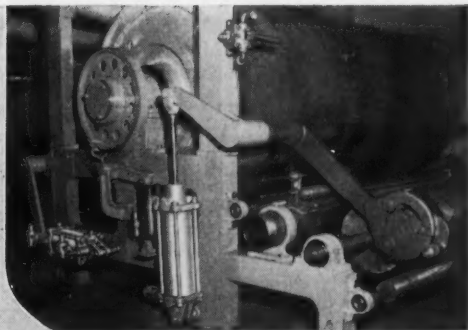
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ELECTRIC MANUFACTURING CORP.
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CLOTH-FINISHING MACHINES

... employ

NOPAK Cylinders to Raise and Lower Rollers



The David Gessner Company, Worcester, Mass., manufacturers of modern cloth finishing equipment, employs NOPAK Air Cylinders in its sizing machines to raise and lower heavy rollers, and, in some cases, to equalize roller pressures. The examples pictured may suggest how you, too, can use NOPAK Cylinders, controlled by NOPAK Operating Valves, to build accurate, simplified machine movements into your plant equipment, or into machinery that you manufacture for resale.

The NOPAK Application Manual shows you how NOPAK Valves and Cylinders are being used in all types of industry, in many types of machinery and equipment for pulling, pushing, lifting, lowering, clamping, positioning. If you haven't seen a copy, ask your NOPAK representative, or write.

GALLAND-HENNING NOPAK DIVISION

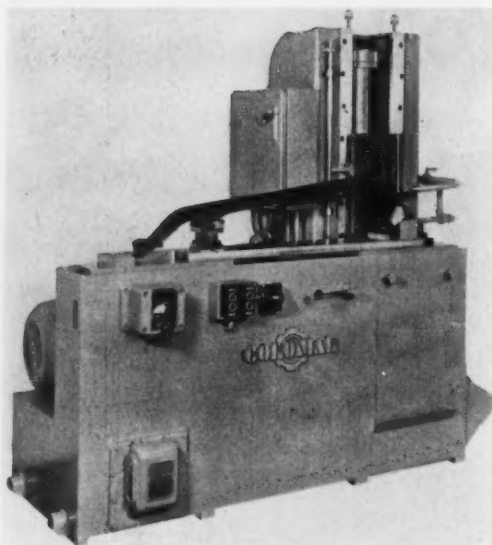
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Bulletin SW-2

Representatives in
Principal Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE



This setup for broaching kingpin holes in the front axles for automobiles includes a vertical pull-down broaching machine and two simple fixture sections for locating and supporting the axle during the broaching operation.

Broaching Kingpin Holes

KINGPIN holes in the front axles for automobiles are now being broached accurately and at high rates of speed on the special broaching machine shown herewith, which was developed by the Colonial Broach Company. The key to the high production speed and accuracy is the extremely simple fixture, devised by engineers at Colonial, that supports the I-beam during the broaching operations.

The machine handling this job is a vertical pull-down unit which is rated

at 6 tons and has a 24-in. stroke. Two simple fixture sections locate and support the axle. An interesting fact is that despite the construction of the part, the fixture does not include a clamp. The smooth action of the broach being pulled through the part and one fixture section is sufficient to hold the axle in rigid and accurate contact with the fixture during the working stroke.

A second section of the fixture is comprised of two blocks—one rigidly mounted to the fixture base with the block mounted at an angle on top. With this simple fixture arrangement, the operator merely lowers the axle mounting pad onto the angle support block and, with the broaching tool, aligns the kingpin hole with the locating hole in the first section of the fixture.

The rough kingpin holes on the steel forged I-beam axle are 0.906 in. in diameter. After broaching, the hole has a 0.922-in. diameter and a length of 2.435 inches.

COLLET TYPE PIN GAGE HANDLE

Bushings for cylindrical and thread plug gages.



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Seven years service for STANOIL Industrial Oil at David Bradley Mfg. Works —No down time for lubrication



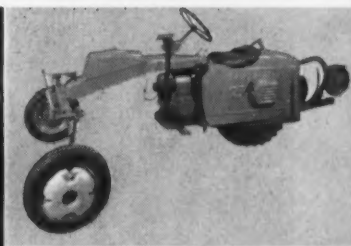
Seven years ago David Bradley Mfg. Works installed 900 gallons of STANOIL Industrial Oil in an HPM press. There's been no down time required for lubrication maintenance since. A pump by-pass screen filter is the only filtering the oil receives, yet the system continues clean. In March, 1954, an analysis of the oil showed:

Viscosity @ 100° F.....980
Color, NPA..... 6
Neutralization No..... .11

STANOIL Industrial Oil has long been at work for Bradley. Successful operations with it in other equipment caused Bradley engineers to specify STANOIL for this installation.

The HPM double acting, fast traverse hydraulic press reported on here is used to draw the upper frames for the David Bradley Tri-Trac, compact farm tractor. The Tri-Trac is the newest implement in the Bradley line. Bradley has been making farm implements since 1832.

Like to know more about STANOIL? Perhaps it can serve you as efficiently as it is serving David Bradley. Lubrication specialists in any Standard Oil office will be happy to help. In the midwest, a call to one of them will bring a prompt response. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



David Bradley Tri-Trac, handy piece of farm equipment gives farmer new opportunity for mechanization at low cost. Upper frame is part formed in HPM press.

L. R. Cummings (left), Standard lubrication specialist, inspects sample of STANOIL, with Robert C. Menken, Plant Engineer of David Bradley Manufacturing Works. Larry Cummings has been serving industrial customers for Standard Oil since graduation from the Standard's Sales Engineering School. His mechanical engineering degree from Tri-State College of Indiana qualified him for this work. Customers of Larry's find this experience and background pay off for them.



STANDARD OIL COMPANY (Indiana)

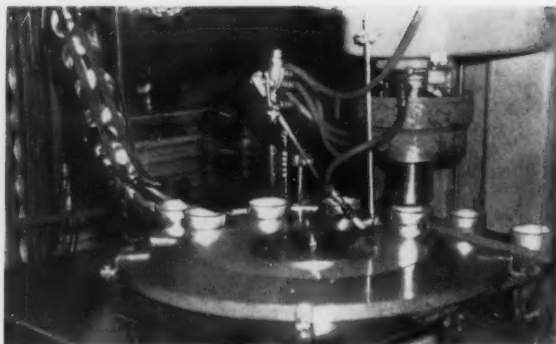


Fig. 1—Cans about to be redrawn are shown being fed onto index table at Vulcan Tin Can Company. One can is just about to be redrawn.

Blanking and Redrawing Cans Automatically

HIGH rates of rejections on finished parts and cumbersome space-consuming equipment were two problems solved when the Vulcan Tin Can Co., Bellwood, Ill., mechanized its can blanking and redrawing operation.

ison Engr. Co., Columbus, Ohio.

The action of the index table is interlocked through the hydraulic system of the press for positive sequence of movement. The table dial is regulated for approximately 35 indexes per minute. By the use of automatic hoppers to feed workpieces to the index table and automatic ejection devices

This job, formerly performed manually, is now done automatically on a self-contained 6-ton C-frame type hydraulic press equipped with an index table, both made by The Den-

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RESINWOOD DIVISION

Rock Island 6 Illinois



51 holes in cover and valve body vary in diameter from $\frac{1}{16}$ " to $\frac{13}{16}$ ".

HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on

close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.

Write for Bulletin S-11.

ZAGAR TOOL, INC.

24000 Lakeland Blvd., Cleveland 23, Ohio



TOOLS FOR INDUSTRY
and SPECIAL MACHINERY

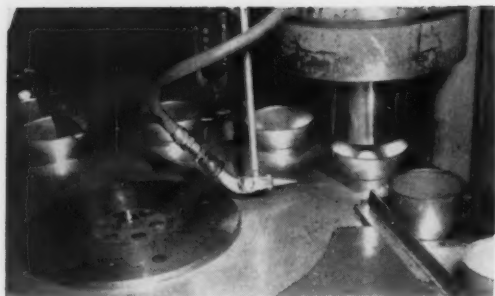


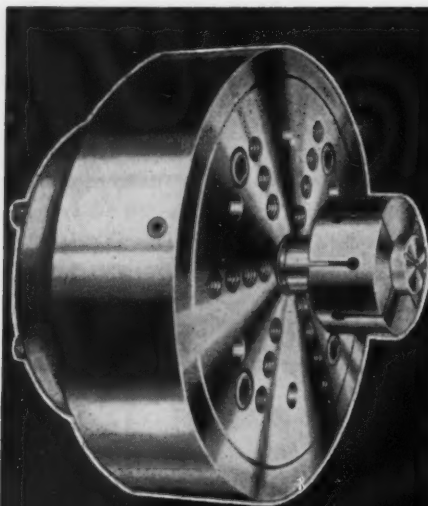
Fig. 2 — The nozzle in the foreground is used to spray coolant on the cans to prevent them from catching and being damaged in process. The rail on the right "catches" the finished part for ejection.

which dispose of finished parts, the operation is made completely automatic. In this instance, the ejection device used is a "brush-off"; however, compressed air, push-out and punch-through are some other devices that could just as easily have been adopted.

The hoppers feed the preliminary shells, which are to be redrawn, onto the index table, as shown in Fig. 1. The table indexes in positive sequence

with the action of the press ram through the control system of the hydraulic power unit. As each can is redrawn, another can is moved into position down the hopper feed and onto the index table as the press ram ascends. The stroke length, ram speed and tonnage of the press have been regulated previously to assure uniform pressure application for every cycle, regardless of dimensional variations in this particular operation.

Ejection of workpieces is accomplished through the action of the in-



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(less accessories,
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3-JR MODEL

6 Features for Tool Room and Production Testing

• This Model 3-JR WILSON "ROCKWELL" Hardness Tester is proving invaluable for tool room use and most production testing. It will pay for itself many times over by eliminating costly complaints from your customers.

These features make for accuracy and long life—

(1) Totally enclosed dirt and dust-proof "Zero-minder" dial gauge. (2) Gripsel clamp screw for quick change and proper seating of penetrator. (3) All controls conveniently grouped.

(4) Enclosed, easy-to-reach, variable speed dash pot. (5) Stainless steel elevating screw. (6) Standardized weights.

No matter what your hardness testing requirements, there is a WILSON "ROCKWELL" Tester to meet it. They are in two types—Regular and Superficial. They are in many styles with accessories for testing flats, rods, rounds and odd shapes. Ask about the WILSON TUKON for micro-indentation testing. Write us for complete information and recommendations.

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TUKON**

dex table. As the part is carried from the ram station, it is caught by a rail mounted above the table, as shown in Fig. 2. As the table moves to the next position, the motion carries the workpiece off the table into a chute. Approximately 2,000 cans are drawn each hour using this automatic method. As

an added precaution against part damage in this operation, a nozzle is provided which sprays a lubricant on each part in process.

Carbide Step Mills Adapted to Handle 13-Ft. Spars

THE milling of $2\frac{1}{4} \times 3 \times 156$ -in. long offsets in aircraft spars at Fred N. Wells Inc., Los Angeles, Calif., is now being done in only one pass with step mills utilizing tungsten carbide-tipped inserted blades. Heretofore, five passes were required. In addition, the operation is now performed at increased speed with resultant longer life between cutter regrinds.

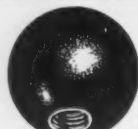
Hogging cuts are made on two S.A. E. 4140 (normalized) steel bars at one time using left and right-hand cutters on a 20 h.p. Ingersoll double-side head planer mill built prior to 1920. To obtain a higher operating speed for the most efficient use of carbide cutters, roller bearings were installed in each side head spindle. Prior to offset milling, the sides of each bar are face milled to remove any adhering forging scale.

Using a 6-in. diameter cutter at 2.5 i.p.m., 44 r.p.m., and $\frac{1}{2} \times 3$ -in. cut, milling time for two bars was formerly 20 hours. This operation is now performed in only 3 hours with 5-in. di-

REID

TOOL ROOM ACCESSORIES

CONTROL BALL HANDLES



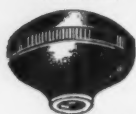
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to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS



Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool!

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

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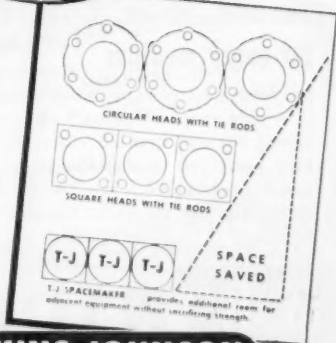
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T-J **Spacemaker** **CYLINDERS**

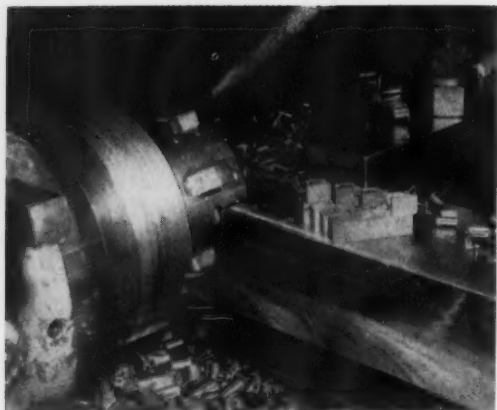
- ★ Oil pressure to 750—AIR to 200 P.S.I.
- ★ New Compact Design . . . Saves up to 40% Space
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- ★ Super Cushion Flexible Seals for Air . . . New Self-Aligning Adjustable Oil Cushion
- ★ Hard Chrome Plated Bodies and Piston Rods

Compare feature by feature—you'll see why T-J Spacemaker Cylinders are today's top choice for streamlined power movement in automation! The only cylinder with all the extras as standard. Write for bulletin SM-454-2. The Tomkins-Johnson Co., Jackson, Mich.



TOMKINS-JOHNSON

PNEUMATIC AIR AND HYDRAULIC CYLINDERS CUTTERS (CLIMBERS)



Milling $2\frac{1}{4} \times 3 \times 156$ -in. long offset in one pass on S.A.E. 4140 steel aircraft spars with step mills utilizing Kennametal-tipped inserted blades. Set of four lug-type blades (shown on workpiece) takes proportionate amount of the $2\frac{1}{4}$ -in. wide cut at $1\frac{1}{2}$ i.p.m. and 160 r.p.m. Milling time with these cutters is only 20 minutes.

ameter left and right-hand step mills, each having four brazed inserted blades which are carbide tipped with Grade K2S Kennametal of a size $\frac{3}{8} \times \frac{1}{2} \times 3\frac{1}{4}$ in. long. All blades have a 7-degree negative radial rake; a 10-de-

gree positive axial rake is provided on blades 1 and 3 and a 10-degree negative axial rake on blades 2 and 4. Each blade takes a proportionate amount of the total $2\frac{1}{4}$ -in. wide cut at $1\frac{1}{2}$ i.p.m. and 160 r.p.m. Chipload is 0.007 in. per tooth; depth of cut is 3 inches.

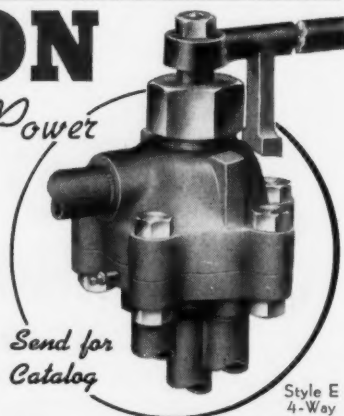
Climb milling is performed to within 3 in. of the bars ends, after which the ends are cut off. (Enough surplus length permits sawing bar stock to

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For cylinder control, distributing, metering and for many special operating cycles. Installations in a wide range of plants have been in constant service for well over 25 years. Specially treated hard seats and lapping flat discs; choice of six metal combinations; positive protection against grit. Sizes $\frac{1}{8}$ " to $2\frac{1}{2}$ ". Pressure to 5000 lbs.



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- ☒ MATERIAL . . high chrome and carbon bearing steel for maximum wear.
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 - ☒ CONCENTRICITY . . assured by grinding on arbors after the holes are finished.
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XLO

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EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

High speed shaving setup for
Ford transmission gears

finished length.) This method is employed due to the fact that the planer mill has no backlash control on its feed gear.

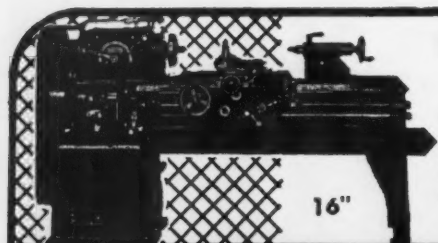
With the previously used cutter, three regrinds were required to mill one piece. With the carbide cutters, two bars are milled and then the cutters are reconditioned. To regrind the removable carbide blades requires only a matter of 30 minutes per cutter.



Ford Transmission Gears Finished in High Speed Shaving Setup

THE job of shaving gears to ensure quiet, smooth operation in the Ford automatic transmission is accomplished quickly and automatically at Ford Motor Company's Automatic Transmission Division plant at Cincinnati, Ohio. The only operator attention required is filling the automatic load-

ers and taking away the finished gears. One man easily keeps three Model 870 underpass gear finishers (made by Michigan Tool Company, Detroit) on the line turning out 600 planet gears per hour. Gears to be shaved are checked automatically for size by a fixture at the entry end of the loader. The gears move down a gravity chute for the shaving operation and drop onto a conveyor when finished.



CARROLL AND JAMIESON LATHES

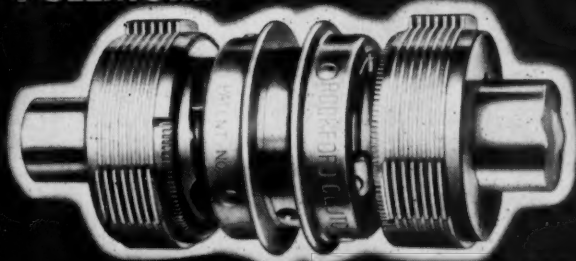
● This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin 39-A-10.

THE CARROLL & JAMIESON MACHINE TOOL CO. BATAVIA, OHIO, U.S.A.

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DOUBLE OR SINGLE TYPE APPLICATIONS

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POSITIVE NEUTRAL

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LONG WEAR LIFE

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and **POWER TAKE-OFFS**. Contains diagrams of unique applications.



Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER

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CLUTCHES



Engine parts layout man at Ford Dearborn Engine Plant is shown measuring the flatness of a granite surface plate using a Watts Microptic Auto-Collimator.

Measuring Surface Plate Flatness

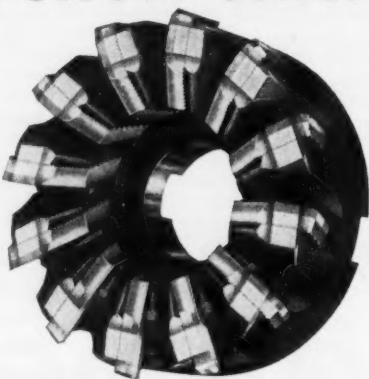
USING a Watts Microptic Auto-Collimator, an optical tooling instrument of the Engis Equipment

Company, Chicago, an engine parts layout man at the Dearborn Engine Plant of Ford Motor Company is shown herewith measuring the flatness of a granite surface plate. According to the manufacturer, the precision instrument permits the plotting of any errors from a straight line or true plane to a few millionths of an inch. Its reference is a bundle of light beams which invariably travel in a truly straight line.

APEX INSERTED-BLADE METAL-CUTTING TOOLS

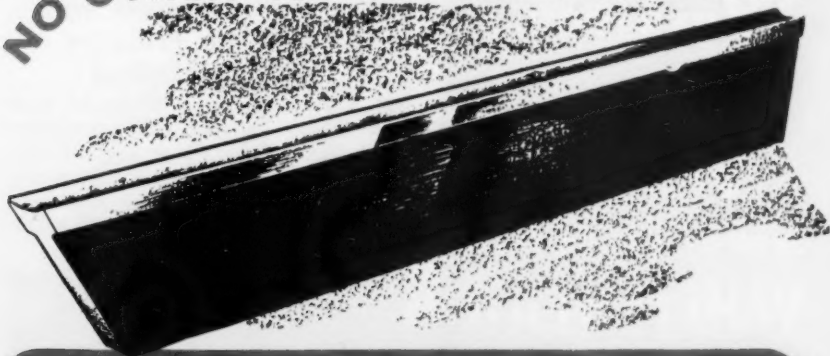
Here's a PRODUCTION Cutter for your HEAVY DUTY JOBS

APEX offers many cutters for many jobs. Here's one that takes a big chip fast. It can be had with H.S.S., Stellite, Cobalt or Carbide tipped blades. These blades adjust automatically in two directions. No damage to carbide tips. Diameters from 8" to 24". We also make cutters for lighter work. Write for catalog.



APEX TOOL & CUTTER CO., Inc., Shelton 15, Conn.

NO OTHER CUT-OFF BLADE LIKE THIS!



None can do what **EMPIRE'S**
Luers Cutting-off Blade
will do

Empire Tool Co. is the **LEADER** in cut-off blade developments—backed by twenty years' experience in cut-off blade manufacture.

Cut-off blades are tools subject to conditions different from those of other tools and will perform most efficiently only when specialists' recommendations are followed.

Available from stock are blades of four types of high speed steels developed to meet the demands of cut-off operations. And on short notice you can get blades of cast alloys and tungsten carbide.

Made under license issued by John Milton Luers Patents, Inc.

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January, 1955

MODERN MACHINE SHOP 195

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1500 SPECIAL SIZE DIES ON HAND.

Whitehead makes washers and shims from any metal or special material to your specifications. Thickness from .002" to $\frac{3}{8}$ ".

In stock: S.A.E. standard light, medium, and heavy steel washers; brass and copper, small and large patterns; bolt sizes. Write for Whitehead's Catalog.

54-4



**WHITEHEAD
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Vacuum Cleaner Part Production Increased with Automatic Pressure Staking Method

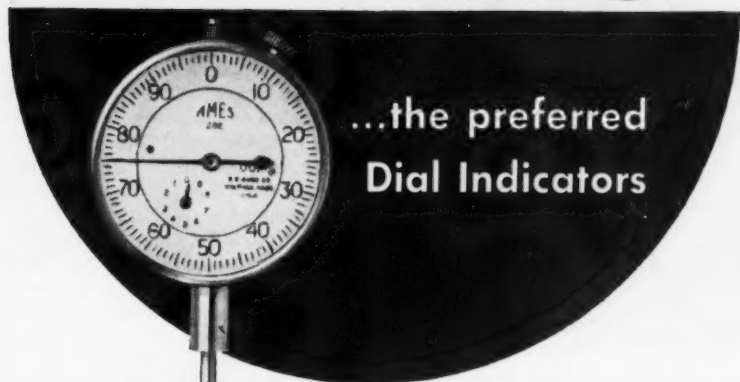
AN increase in production of more than 50 per cent has been realized by the Scott-Fetzer Company of Cleveland since the installation of a hydraulic press method for staking of bearings on brush ends for use in Kirby



The operator loads a brush end onto a bearing which she has previously placed on the work station. At the depression of the foot lever (operated manually) the ram will descend and stake together the bearing and the brush end which can be seen underneath the ram. This done, the operator removes and places completed part in storage bin at right.

vacuum cleaners. In addition to increasing output on this operation from 270 to 400 completed units per hour, rejects have been reduced considerably. This pressure staking method has also reduced costs over the former method and provided a quieter and easier operation which lessens operator fatigue.

AMES



Over 16,000,000 cycles
without wear or loss of accuracy ...
how many more will they complete?

Several Ames Model 282 Long Range Dial Indicators *with plain bearings* are currently giving an amazing demonstration of performance and endurance under test conditions. After more than 16,000,000 cycles each, at 240 strokes per minute, 9 hours a day—they still have their original accuracy!

The reasons for this outstanding record? Simply high quality materials, simple basic design, rugged construction ... and expert craftsmanship.

If you would like to have our recommendations on your measurement problem, send blueprints and specifications. And ask for your free copy of our catalog on Ames micrometer dial indicators and gauges.

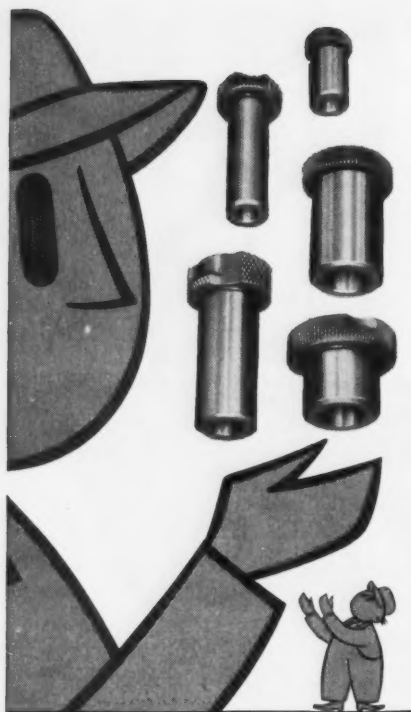


Representatives in
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The hydraulic press used in this staking operation is a 1-ton Denison Multipress which provides a pressure range of 200 to 2000-pound ram effort. In operation, the press control valve causes downward travel of the ram without pressure build-up. As the punch contacts the work, downward travel is halted momentarily and pressure begins to build up in the cylinder. This continues until the elastic limit of the material is overcome and the metal is literally squeezed into the shape required by the contour of the punch.

When the present pressure level of the hydraulic system has been reached—the resistance of the work being equal to the ram force—no further deformation takes place. The system remains static until the control valve shifts and the ram returns to up position. Pressure is preset and controlled by means of a relief valve.

The hydraulic press is equipped with a dial feed coupled with the press for automatic operation. The action of the dial feed is interlocked through a mechanical linkage with the press for positive sequence of movement. The table dial works at approximately seven indexes per minute. It is actuated by an operator foot pedal. As the ram rises, the next work station and the dial move under the ram and the pieces are staked at the depression of the foot lever by the operator.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



measuring up

*...and REX is the standard
by which all high speed
steels are compared*

An older brother sometimes makes a handy yardstick for measuring junior's growth. And when it comes to tool steels, REX® High Speed Steel is — and has been for over 50 years — the standard of comparison.

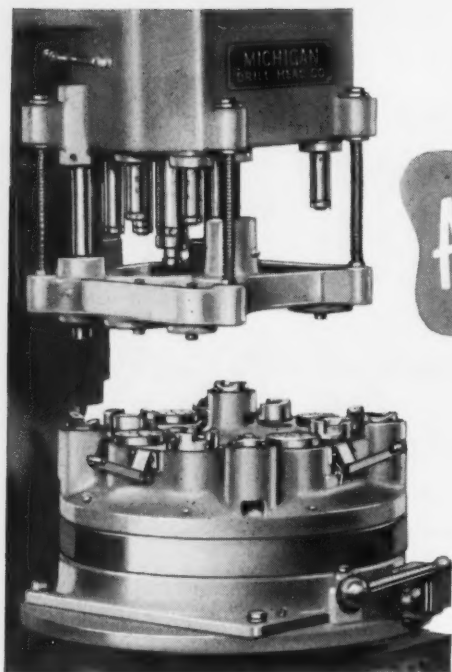
There's no mystery to REX High Speed Steel. Its quality has been time-tested in thousands of shops. And after all, it's performance — not claims — that really counts. Make your *own* comparison test. Put REX High Speed Steel to work. Compare its structure, finish, hardenability, carbide distribution and general uniformity. You won't find another high speed steel that surpasses REX.

Remember, too, that even though it is widely distributed and used, REX High Speed Steel is made *only* by Crucible. So for tops in high speed steel performance, be sure you order the Crucible REX brand. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE

first name in special steels

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You can do

AMAZING

THINGS

on a small
drill press

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you can drill, ream and finish bore pressure plates for hydraulic pumps, on the drill press pictured above.

Here's a nine spindle drill head bushing plate and fixture and, a four-station hand operated index table—mounted on a Michigan Hydro 3 Drill Press. It's really amazing!

We also invite your inquiries as to our line of tapping units, and index tables—both manual and automatic—catalog sent on request.

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engineers and manufacturers of production machines and drilling equipment

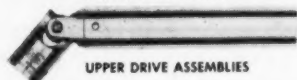
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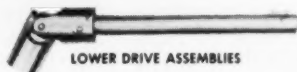
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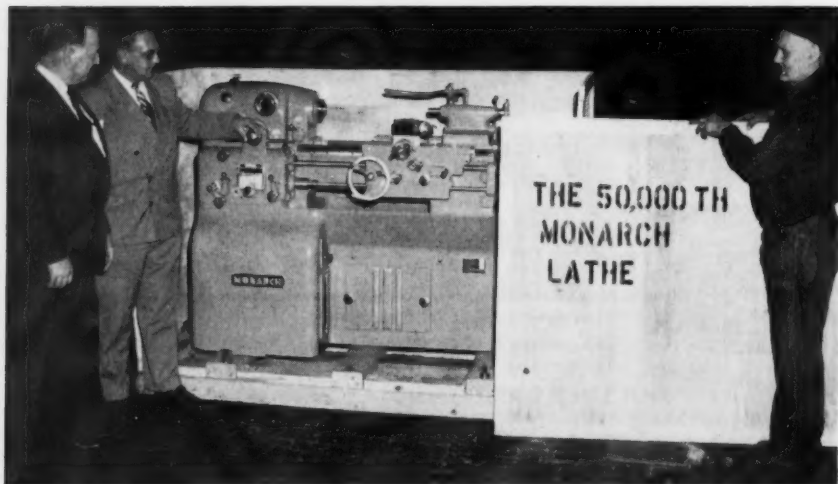
news of the industry

50,000 Lathe Shipped Recently by Monarch

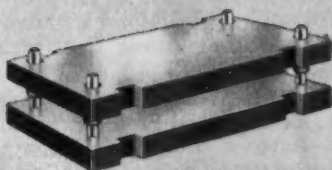
The 50,000 lathe produced by The Monarch Machine Tool Company was recently shipped from the plant of the 45-year-old Sidney, Ohio, firm. Purchased by Sylvania Electric Products of Huntington, West Virginia, it was a 10-in. Model EE machine, one of several models of sensitive precision tool-

makers lathe which Monarch has been building since the mid-30's. In particularly urgent demand during the retooling of industry to meet the emergency created by World War II, it was the production (literally by the thousands) of these toolmaker lathes which gained for Monarch back in November, 1941, the first Navy E Award to be given to any company in Ohio.

Illustration showing (left) Jerome A. Raterman, president, and Stanley A. Brandenburg, sales vice president, inspecting the 50,000 lathe produced by Monarch Machine Tool Company while it is being readied for shipment.

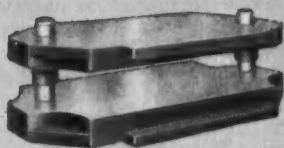


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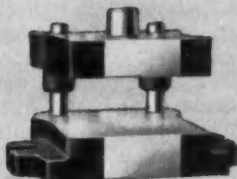
Special ALL-STEEL Die Sets

... of any type or size accurately made to the most exacting specifications.



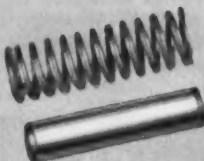
Special SEMI-STEEL Die Sets

... using premium castings for high tensile strength and good machining qualities.



Stock DIE SETS

... Precision or Commercial ... available for prompt shipment in a wide variety of sizes.



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... an extensive range of high-quality die-makers' supplies in stock for immediate delivery.

Detroit DIE SET CORPORATION

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BUFFALO . . . CI 0163
CHICAGO . . . PU 5-0500
CINCINNATI . . . HU 7775
CLEVELAND . . . TO 1-0860
DALLAS . . . TE 5029
DAYTON . . . HE 3042
DECATUR, ILL. . . B-3474
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EL CERRITO, CAL. . . LA 5-5071
FLINT, MICH. . . 5-7361
GRAND RAPIDS, MICH. . . CH3-1895
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INDIANAPOLIS . . . HU 5604
KANSAS CITY, MO. . . VI 3558
LOS ANGELES . . . AD 7251
MILWAUKEE . . . GL 3-7170
MINNEAPOLIS . . . OR 5-7980
NASHVILLE . . . 6-2597

NEWARK . . . MA 2-4318
NEW ORLEANS . . . RA 6528
ORLANDO, FLA. . . 2-3747
PHILADELPHIA . . . VI 4-4084
PITTSBURGH . . . LO 1-4011
ROCK ISLAND, ILL. . . 8-2814
ST. LOUIS . . . FR 1-6810
SEATTLE . . . EL 1454
TOLEDO . . . MA 4510
TORONTO, CAN. . . KE 2972
WASHINGTON, D.C. . . AD 4-5700

Monarch has also announced the unveiling of its latest product, a distinctly new and different kind of metal-turning machine which is designed to allow carbide tooling to be used to its fullest advantage on work of considerable size. Reminiscent of automotive terminology, the outstanding feature of the new lathe has been called the Dyna-Shift, with which any desired

speed change required for a metal-cutting job can be obtained with the flick of a wrist.

Babcock & Wilcox Purchases Globe Steel Tubes Company

The assets and business of the Globe Steel Tubes Co., Milwaukee, Wis., have recently been purchased by The Babcock & Wilcox Company. Terms of the transaction were approved by the board of directors of both companies, and the selling price was said to be approximately \$9,300,000. Babcock & Wilcox has announced that it will continue to operate the Milwaukee plant as a part of its Tubular Products Division. The firm already has two plants in this division, six other plants in its Boiler Division, one in its Refractories Division and a Research and Development Center, as well as an Atomic Energy Division.

Operations at the Globe plant will continue without interruption and present production personnel will be retained. Arrangements have also been made with key management personnel to continue as employees of Babcock & Wilcox. Globe Steel Tubes manufactures seamless and welded stainless, alloy and carbon steel tubing, aircraft tubing, pressure tubing and welding fittings. The acquisition of this plant will increase the variety of products produced by B&W's Tubular Products Division.

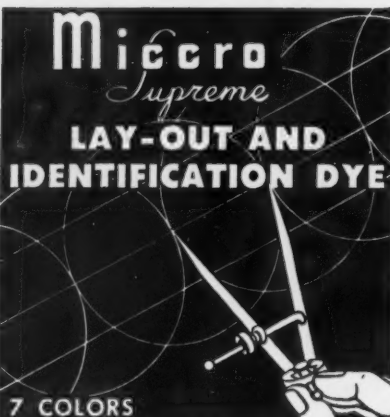
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**LAY-OUT AND
IDENTIFICATION DYE**
7 COLORS

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CUT TOOL COSTS broken tools made like new again with **NU-TANGS**

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6)
Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

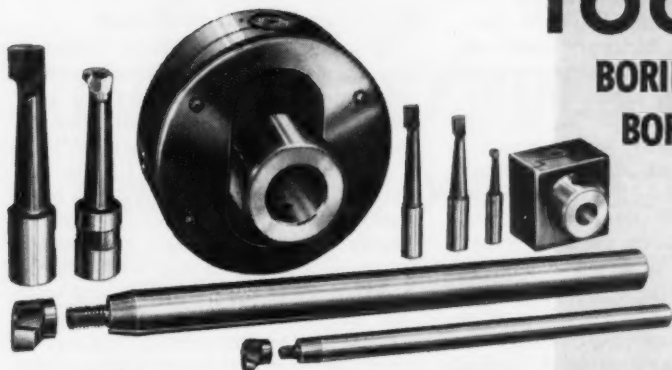
NO WELDING! NO SLEEVES! NO SHORTENING! NO DISTORTION! GUARANTEED STRONG AS NEW! We return them like this!

Patent No. 2,712,093 **NU-TANGS INC.** 1339 Bates Avenue Cincinnati 25, Ohio

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BORING HEADS
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BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

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Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ¼ to 1¼ inches diameter. Bore holes from ¼ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.

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MACHINE WORKS**

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Carl S. Hallauer Elected President of Bausch & Lomb

The election of Carl S. Hallauer as president of the Bausch & Lomb Optical Co., Rochester, N. Y., has recently been announced. Mr. Hallauer, executive vice president of the company since 1952, succeeds Joseph F. Taylor who was named chairman of the board at a recent director's meeting. M. Herbert Eisenhart, formerly board chairman, was named honorary chairman.

Mr. Hallauer will continue as president of Bausch & Lomb Optical Co., Ltd., of Canada, a post he has held since that company was formed in 1935, and of Bausch & Lomb do Brasil Ltd., the firm's South American subsidiary, which he has headed since 1950. He began his career with Bausch & Lomb in 1918 as director of industrial relations. In 1935, he was elected vice president in charge of sales, industrial relations and purchasing.

A popular leader in civic, industrial, and political circles, Mr. Hallauer is

also director of several businesses and banking and philanthropic organizations. He is past president of the Scientific Apparatus Makers Association, past board chairman of the Associated Industries of New York State, and past president of the Empire State Ordnance Association.

Industrial Crane Expands Office and Plant Facilities

Industrial Crane & Hoist Corporation, manufacturer of overhead cranes, jib cranes and monorail systems, recently occupied new and enlarged office and plant facilities located at 1536 S. Paulina St., Chicago 8, Ill. For the past 10 years, the company has been located at 315 North Ada Street in Chicago. Paul W. Pearson, president of the company, stated that with 160,000 sq. ft. of space now available and with the installation of a considerable amount of new machinery and equipment the firm has more than doubled its manufacturing capacity.

ACE SPECIALIZED DRILL BUSHINGS

for specialized jobs!

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4 New Standard Bushings, available in a wide range of dimensions for immediate, overnight delivery.



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For embedment in soft, castable and non-ferrous materials



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SERRATED

For pressing into soft materials

ACE... first to offer a Complete Line of over 22,000 A. S. A. and ACE standard sizes, types and specifications in Drill Bushings, now presents

FOUR NEW MEMBERS

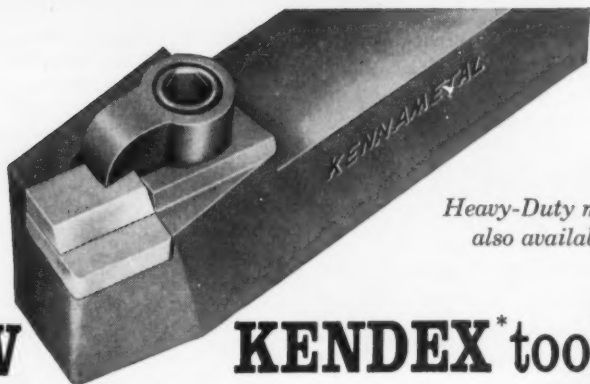
The exclusive 'grooved' design provides a torque-resisting withdrawal-defying 'locked-in-the-jig-plate' connection which, under normal use, will not pull or twist out.

*PAT. PENDING



ACE DRILL BUSHING CO., INC.
5407 Fountain Ave., Los Angeles 28, Calif.

Write for Free Catalog, Price Lists, Quantity Discount Schedules and Technical Data



*Heavy-Duty model
also available*

NEW KENDEX^{*} tooling slashes cost per cutting edge

It's entirely new . . . everything except the long-established Kendex "throw-away button" principle pioneered and proved by Kennametal.

We took a good look at tool cost per cutting edge and designed a new Kendex with a clamp-on, "turnover" insert, plus a new system of chip control. This combination eliminates all regrinding, doubles the usable cutting edges per insert, and slashes tool cost on all types of machining operations. For example: on one job, tool cost was cut from \$1.13 to \$0.06 per piece.

NEW "TURNOVER" INSERTS. The new "turnover" inserts are designed with cutting edges on both sides, and can be indexed in seconds. After all cutting edges are used on one side, turn them over and use an equal number on the reverse side. Square inserts have eight cutting edges; triangular inserts, six.

These cost-reducing inserts are available in two types: (1) Regular, ground on top and bottom with corner radii ground for indexing; (2) Precision inserts, ground on all sides for precision indexing. When all edges are used . . .

replace the insert and eliminate regrinding.

The new Kendex comes in a range of sizes in two models—Standard and Heavy-Duty. The Standard model is available with either Regular or Precision inserts; the Heavy-Duty with Regular inserts only.

NEW CHIP CONTROL SYSTEM. The new Kendex design not only eliminates regrinding of inserts, but the grinding of chip breakers as well. Standard Kendex tools have replaceable carbide chip breakers which have the widest effective application of any mechanical chip breakers available. On many jobs, the chip breaker can be removed to prolong tool life. Heavy-Duty sizes are fitted with rigid, inexpensive spring clamps which serve as chip deflectors.

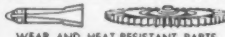
Replaceable, hardened steel shims (available on the larger shanks) prolong tool life, reduce tool maintenance, and eliminate grinding of holders in case of accident with the tool.

For complete information, call your Kennametal representative, or write KENNAMETAL INC., Latrobe, Pa. A-27

^{*}Registered trademark

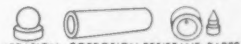


MINING, METAL AND WOODWORKING TOOLS

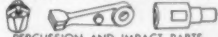


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INDUSTRY AND
KENNAMETAL
...Partners in Progress



ABRASION, CORROSION-RESISTANT PARTS



PERCUSSION AND IMPACT PARTS

Norton Expands Electric Furnace Facilities

Norton Co., Worcester, Mass., will add to its electric furnace capacity by building a new plant in Huntsville, Alabama. This expansion of Norton's electric furnace facilities, located since 1910 in Chippawa, Canada, will be situated on a 100-acre site in an area

known as Hobbs Island along the north bank of the Tennessee River. The new plant is expected to be completed by the end of 1955, and the total cost of land, buildings and equipment is estimated to be \$1,250,000. The plant will produce Magnorite refractory grain (fused magnesia), fused zirconia, Norbide refractory grain (Norton boron carbide), and special products for the Atomic Energy Commission.

The plant will consist of two electric furnace buildings, an office and utility building and a research building. It will employ approximately 100 people at the start. With the exception of key supervisory and technical personnel, local people will be recruited. The overall operation of the new plant will be directed by Howard J. Daly, Norton's electric furnace plant manager in Chippawa.

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machine products field
Making the finest
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COUPLING BOLTS
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Industrial Distributors.

Gisholt Announces Extended Payment Plan for Machine Tools

A new extended plan, with some interesting new twists, has recently been announced by the Gisholt Machine Co., Madison, Wis. The new plan, coupled with the leasing plans announced in April, 1954, provides a complete program which makes it easier for many firms to have the advantage of the most modern Gisholt



Air-O-chek
GUN **COMPRESSED AIR**
ECONOMY

In machine shop and foundry clear away chips, dust, dirt and surplus material quickly . . . AND SAVE through low initial cost, superior performance, low maintenance. Air-O-chek air guns are of simple design, sturdy construction and are easy to use.

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OBSOLETE EQUIPMENT
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COMPETITION**

Old-fashioned, out-of-date and outworn equipment has no place in any modern industrial plant . . . and certainly plays havoc with your chances of competing successfully.

SIDNEY FLUID TRACER LATHES

THE "LAST WORD" IN
COST-SAVING EFFICIENCY

You save amazingly on production-time per piece — in large or small quantities. You save on maintenance. Result: your costs are reduced so that you can compete . . . and **GET THE ORDERS!**

The sensitive tracer head transfers

every change in contour from the master piece or template to the cutting tool regardless of size, shape or quantity. Change-over to standard lathe operation or back to tracer requires only a few **SECONDS** since no addition or removal of extra parts is necessary.

WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

tools at all times. Expressing confidence that a large percentage of machine tool sales would come under the time payment plan in the future, George H. Johnson, Gisholt president, pointed to the new tax codes and the faster depreciation allowable on new equipment.

In setting up its new plan, Gisholt has gone beyond the usual financing plans to accommodate and save money for the customer. For example, any

new Gisholt machine can now be obtained with an initial down payment of only 20 per cent. The balance may be spread in equal payments over 12, 24, 36 or 48 months, depending upon the plan selected. The Gisholt method also reverses the usual pattern of handling interest charges by starting with the lowest amount and gradually increasing. This method favors the buyer because it gives him the use of that much more cash during the earlier payments. Also, since the buyer has the privilege of prepaying notes at any time without penalty, he may thus avoid the higher interest payments toward the end. Low interest rates range from 3.25 per cent on the original unpaid balance for the one-year plan to 3.06 per cent for the four-year plan. Gisholt also absorbs legal fees up to the time the machine is shipped.

With the rapid developments in leasing and buying industrial equipment, many executives are puzzled as to which methods to use under certain conditions. To help them answer their own questions, Gisholt has prepared a new bulletin on the subject. The bulletin discusses leasing and time payment plans, makes cost comparisons, outlines depreciation under the new tax codes, and so on, so that the user can appraise his own situation and find the best answer to his own particular questions. The new Gisholt bulletin is entitled, "What You Should Know About Buying and Renting Ma-




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Stainless Steel

PRECISION GROUND

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SMALL PARTS
DOWELS — STRAIGHT
FORMS
MADE TO BLUEPRINTS

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LUERS

PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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ELECTRO-MAGNETIC CHUCK CONTROL



50 to 15,000 Watts
... 60 to 20,000 Sq.
In. Chuck Area.

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production.

ELECTRO-MATIC RECTIFIER



50 Watts to 40
Kilowatts

Engineered for dependable power conversion in constant year after year service. Quiet and efficient. For all industrial applications.

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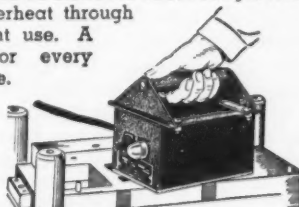
NEUTROL CHUCK CONTROL and HOLDING POWER REGULATOR



Combines the advantages of NEUTROL with the benefits of absolute voltage regulation. Control of holding power is infinitely variable through entire dial range. Best holding power predetermined for an operation is automatically repeated. Assures true parallel grinding. Manual or automatic control models.

ELECTRO-MATIC A.C. DEMAGNETIZER

Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.



All Models Fully Warranted

Special Models Engineered to Meet Every Need
Your Inquiries Will Be Promptly Answered Without Obligation.

ELECTRO-MATIC PRODUCTS CO.

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Glendon H. Roberts (center), president of Detroit Stamping Company, explains function of one of the company's products to Ernst O. A. Berendt (right), German-trade magazine editor, and Vernon Greene, Foreign Operations Administration project manager.

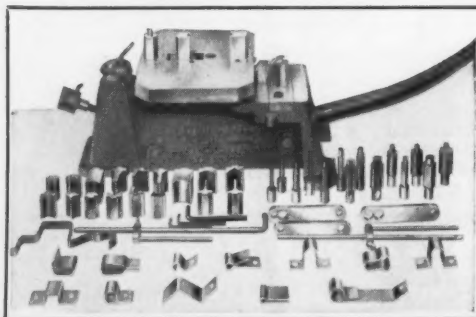
chine Tools." Copies may be obtained by writing Gisholt Machine Co., Madison 10, Wisconsin.

German Editors Visit Detroit Stamping Company

Ten German trade-magazine editors were recent guests of the Detroit Stamping Company as a part of a nation-wide tour under the sponsorship of the federal government's Foreign Operations Administration. Detroit Stamping, the only plant to be visited in the Detroit area, was chosen as one of several U. S. firms whose modern manufacturing facilities provide a good source of information for articles

to be written in German trade magazines covering American manufacturing and merchandising methods. Under the guidance of Glendon H. Roberts and William H. Roberts, president and vice president respectively of Detroit Stamping, the delegation toured the plant to view the wide variety of stamping operations in process, as well as the tool and die work.

At an extensive question-and-answer session, the editors fired questions regarding the use of trade magazines for merchandising and publicity purposes, and the general methods used in advertising the company's stamping and finished products. The German delegation was headed by Ernst O. A. Berendt, editor of "Deutscher Ingenieur-Verlag," Dusseldorf, Germany. The F.O.A. representative in charge of the tour was Vernon Greene, Washington, D. C.



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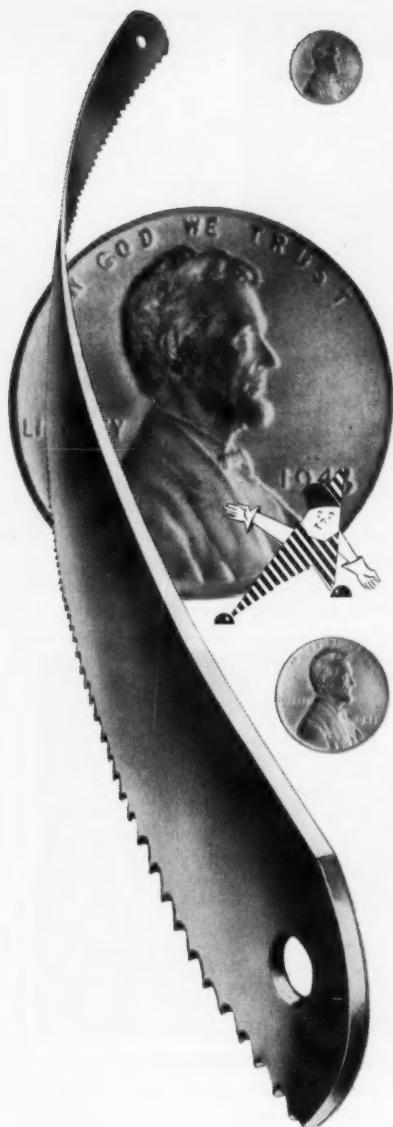
AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

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Costs No More

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**SAFE,
UNBREAKABLE**

*high speed blades
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For over 75 years, industry has *known* STAR Hand and Power Hacksaw Blades as *quality* blades.

Here, as an example, is the STAR Unbreakable High Speed Steel Blade — safe, fast-cutting, long-lived. The STAR combination of a flexible steel back, special-process weld and high speed steel cutting edge adds up to an efficient, shatterproof, proved-quality blade.

STAR SERVICE COSTS NO MORE

Order any of the complete line of STAR Blades from your Industrial Distributor — your best source of supply for hundreds of the items you need to operate efficiently, economically, and without production interruptions.

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MIDDLETOWN, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saws and Clemson Hand and Power Lawn Machines.



1018

January, 1955

MODERN MACHINE SHOP 213



Newly elected N.T.D. M.A. officers: (left to right) Philip R. Marsilius, treasurer; Joseph N. Huser, first vice president; Jerome H. Stanek, president; Herbert Harig, second vice president; and Harold G. Murdock, secretary.

Jerome H. Stanek Elected President of N.T.D.M.A.

At its annual meeting held recently in Dayton, Ohio, the National Tool & Die Manufacturers Association elected Jerome H. Stanek, vice president of Stanek Tool & Mfg. Co., Milwaukee, Wis., as president of the association for 1954-55. Other officers elected at the meeting were Joseph N. Huser, president of B & H Specialty Co., Inc.,

Indianapolis, Ind., first vice president; Herbert Harig, vice president of Harig Mfg. Corp., Chicago, Ill., second vice president; Harold G. Murdock, vice president of Arrowsmith Tool & Die Corp., Los Angeles, Calif., secretary; and Philip R. Marsilius, vice president of The Product Machine Co., Bridgeport, Conn., treasurer (re-elected). George S. Eaton will continue as executive secretary and Charles R. Bender as assistant secretary.



RUEMELIN FUME COLLECTORS KEEP SHOP CLEAR OF WELDING FUMES

This well ventilated welding department is typical of hundreds of similar installations. Welding operators appreciate smoke and gas-free atmosphere. Thousands in service. Many repeat orders. Collecting fumes at the source with local exhaust hoods has proven most practical in operation. It is particularly helpful in winter months when doors and windows are closed.

Write for Bulletin 37-E describing all types of Ruemelin Fume Collectors.

RUEMELIN MFG. CO., 3996 NO. PALMER ST.

MILWAUKEE 12, WIS., U. S. A.

Mfrs. & Engr. • Sand Blast & Dust Collecting Equipment

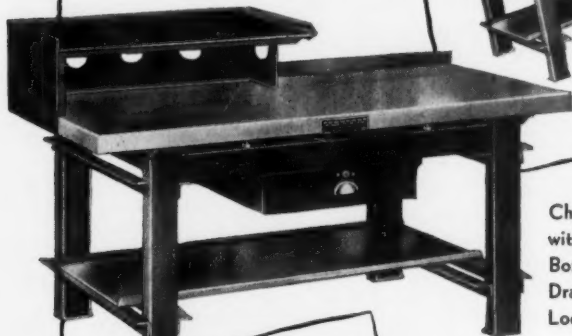
It's **CHALLENGE** CAST-IRON TOP WORK BENCHES for all-round shop efficiency!

3 Styles - 4 Sizes

All with durable 2-inch warp-proof, shrink-proof, fire-proof cast-iron top. All have leveling screws. All built to a high standard of Quality.



Challenge Work Bench
with tool box shelf.



Challenge Work Bench
with Cast-Iron Top, Tool
Box Shelf and a Steel
Drawer with Pilfer-Proof
Lock.



Challenge Work Bench
without shelf or drawer.

TOP SIZES

4 Legs	6 Legs
28x48x2	28x72x2
28x60x2	28x84x2

Semi-Steel

LAYOUT SURFACE PLATE for layout, inspection or assembly lines. Available either precision ground or planer finished. Sizes from 12x18" to 54x144".



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THE CHALLENGE MACHINERY CO.

Office, Factories and Show Room:
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Over 50 Years in Service
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DEALERS IN ALL PRINCIPAL CITIES

January, 1955

MODERN MACHINE SHOP 215

772

9th Western Metal Congress and Exposition

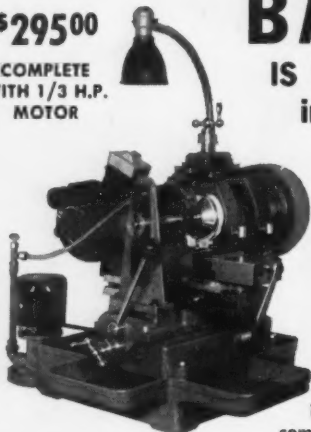
Sponsored by the American Society for Metals, the 9th Western Metal Congress and Exposition is scheduled to be held March 28 through April 1, 1955, in the Pan-Pacific Auditorium, Los Angeles, California. More than 20 technical societies, having divisions in the western states, will participate and co-sponsor the exposition. The Los

Angeles members of these societies alone total 20,000. A total of 150,000 sq. ft. of floor space has been made available for the showing of new products, new methods and new services. The response from regular exhibitors and from new exhibitors has been heavy, and 92 per cent of the available space has been assigned to leading industries from every part of the nation. An attendance of 50,000 is expected.

W. H. Eisenman, managing director of the Los Angeles event states that a total of 300 exhibitors are expected to fill the Pan-Pacific Auditorium, as well as two additional exhibit pavilions adjacent to the auditorium. Technical committees are in the process of completing a series of high-level technical sessions which will be held daily during the entire week of the show. Headquarters for the show will be the Ambassador Hotel, 3400 Wilshire Boulevard, where the technical sessions and entertainment features will be held. Hotel reservations should be sent to John Brady, Ambassador Hotel, Los Angeles 5, California.

\$29500

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A FEW OF THOUSANDS OF CUSTOMERS

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Special Accessories on
model shown here available
at slight extra cost.

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in operation and not one
complaint. It's a pretty strong
statement, but true.

Every BARKER is precisely and
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Today, BARKER MILLS are performing
various machining operations in
hundreds of diversified industries,
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here, we'd like to mail you the "BARKER"
story with complete information
on specifications, operational features,
special accessories and the list of
many users, many doubtless in your
particular field.

WRITE TODAY FOR LITERATURE

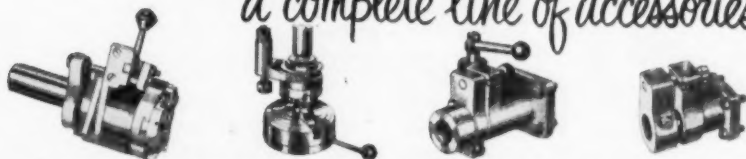
BARKER ENGINEERING COMPANY
500 GREEN ROAD CLEVELAND 21, OHIO

Jones & Lamson offers... a complete line of die heads & chasers



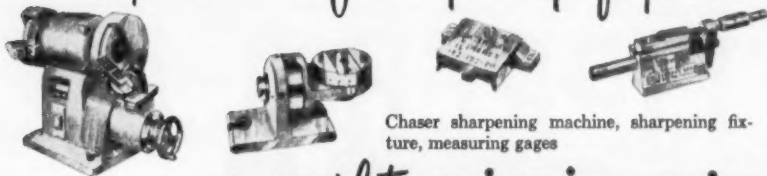
Automatic opening tangent stationary and revolving types, radial stationary type, B&S and small turret lathe types

a complete line of accessories



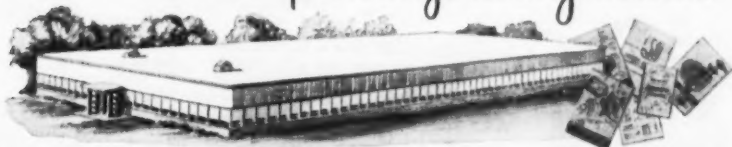
External and internal trip attachments, drill press adapter, floating holders

a complete line of sharpening equipment

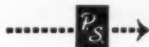


Chaser sharpening machine, sharpening fixture, measuring gages

a complete engineering service



World's newest, most modern thread tool plant. Complete literature for all J&L thread tool products



J&L Automatic Opening Die Heads and Chasers assure: low initial cost — ease of operation — controlled resharpening — use of carbide where applicable. Class III threads guaranteed. This means important savings regardless of your tolerance requirements. Write to Dept. 710 for complete information.

JONES & LAMSON

JONES & LAMSON MACHINE CO., 521 Clinton St., Dept. 710, Springfield, Vt., U.S.A.



Machine Tool Craftsmen
Since 1835

THREAD TOOL DIV.

Van Norman and C.I.T. Join to Offer New Machinery Program

The Van Norman Co., Springfield, Mass., has announced a "radically new" merchandising plan featuring long-term leases, and a 10-year installment sales plan geared to match the new, faster depreciation schedules. James Y. Scott, president, said the new program, believed to be one of the most complete ever offered buyers of machinery, was developed with C.I.T. Corporation, industrial financing subsidiary of C.I.T. Financial Corp.

Buyers can now choose any of five ways to acquire Van Norman machinery: (1) a straight cash purchase, (2) a lease plan running to nine years under which monthly rentals can be written off as expense, (3) a lease plan with an option to buy, (4) an installment plan with equal monthly payments and terms running to five years, or (5) a Pay-As-You-Depreciate plan

with terms of up to 10 years and payments geared to match depreciation allowances under the new tax law. Mr. Scott states that the P-A-Y-D plan was tailored to the so-called sum-of-the-digits method of depreciating equipment, the fastest method allowed. Using the sum-of-the-digits method of depreciation, the owner of a machine which could be depreciated in 10 years would add the actual digits 1, 2, 3, and so on to 10 for a total of 55. Then inverting the digits, the owner could charge 10/55 of the cost to depreciation expense in the first year; the second year, 9/55; the third year, 8/55; and so on until in the last year, 1/55 would be written off.

Payments under the P-A-Y-D program will be made monthly, but will total during any year approximately what the machine owner can "expense off," thus making it possible for machinery users to write off payments

CLIPPER

PRECISION DIAMOND TOOLS



CLIPPER'S NEW B-XX RESIN BONDED DIAMOND WHEELS DRASTICALLY REDUCE COSTS. FIELD TESTS PROVE: **25% MORE WEAR—FASTER CUTTING—MAINTAINS SHARP CORNERS.** CLIPPER MANUFACTURES A COMPLETE LINE OF DIAMOND TOOLS AND WHEELS OF GUARANTEED QUALITY. PROMPT DELIVERY. ASK FOR LITERATURE.



JONES & LAMSON
NX-967-1



CLUSTER
WHEEL
DRESSER
CT-7



HOGUND
FORM
DRESSER



EX-CELLO
48-4105



BORING
TOOL



SINGLE
POINT
DRESSER

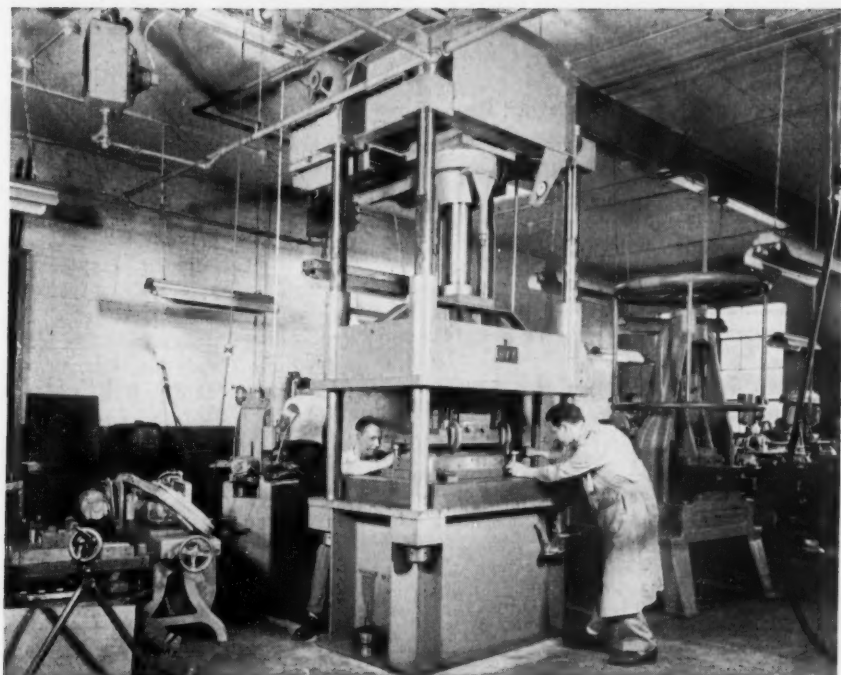


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GRINDER

Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.
21C WEST 46 STREET, NEW YORK 36





The diemaker who made a nuisance of himself

This is the story of Three Star Manufacturing Co.—a custom diemaker who serves a number of manufacturing plants in Chicago.

As in most such shops, his only means of trying out dies was a hand power screw press which sometimes needed six or seven men to get the needed pressure.

Large dies had to be tried out on his customers' production presses . . . which required drayage (\$15 to \$20 each way) and interruption of his customers' production. It meant both expense and nuisance to his customers and himself every

time a die had to be tested.

Now he has ended the nuisance by installing the press shown above in his own shop. It not only saves time and money, but avoids the embarrassment of having workers in his customers' plants see and know that occasionally a die must be taken apart for adjustment.

Specifications for single-acting and double-acting die tryout presses in ten air-operated and sixteen electrically operated models are contained in Bulletin 267—sent gladly on request.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich



Arbor Presses



Hand-Operated Hydraulic



Power-Operated Hydraulic



Guided Piston



Gas Type Presses



Movable Frame

and making the relationship between the rate of payment and depreciation reserves "a realistic one."

Norton Formulates Leasing, Rebuilding, Trading-In and Time Payment Arrangements

Norton Co., Worcester, Mass., will soon announce plans for the leasing, rebuilding, trading-in and time payment arrangements on some of its

standard grinding and lapping machinery. Norton is prepared to lease certain standard machines on a leasing arrangement similar to that used by the Kearney & Trecker Corporation, including their plans A, B and C. The following list of machines will be covered under this arrangement: 4 x 18-Inch Type CTU; 6 x 18-Inch and 30-Inch Type CTU; 10 x 18-Inch and 30-Inch Type LCTU; 10 x 18, 36, 48 and 72-Inch Type CTU; 14 x 18, 36, 48 and 72-Inch Type LCTU; 6-Inch Angular Wheel Slide; 10 x 18 or 36-Inch CV-4 Angular Wheel Slide; 14 x 18 or 36-Inch CV-4 Angular Wheel Slide; "Cam-O-Matic"; 6 x 18-Inch and 8 x 24-Inch Surface; No. 20 Cutter and Tool; 10 x 20-Inch Universal; 12-Inch U-4 Universal; No. 16-FC Lapper; and No. 26 "Hyprolap." Other machines will be considered for special leasing arrangements.

Norton is also expanding its rebuilding operations and has determined a list of certain machines which it will rebuild for a firm price of 45 per cent of the price of a corresponding new machine with the same equipment. Machines included in this list are 6-Inch Type C or CTU; 10-Inch Type LC or LCTU; 10-Inch Type C or CTU; 14-Inch Type LC or LCTU; 10-Inch Type C Angular; 10-Inch Type CD; 14-Inch Type C; 16-Inch Type C; and Type C Multipurpose. Other Norton machines will, of course, be rebuilt, but pricing will have to be determined spe-



**Series 9A—
Power Driven**

POWER MARKING MACHINES

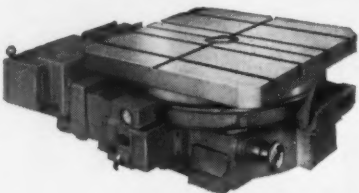


are the last word for high production, high precision marking. A powerful gear reduction motor does the driving. Clutch operated. Fast, smooth and quiet.

Model 9 AMP—Motor Driven, Pedestal Model Shown.
Write for latest color folder.

ACROMARK
Company

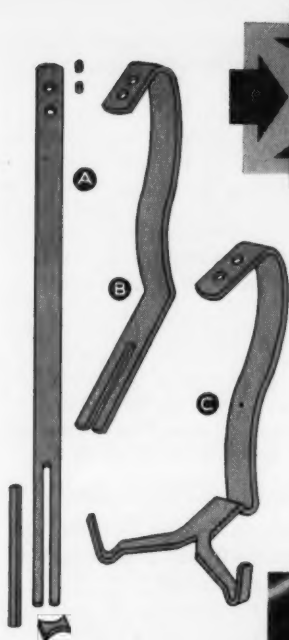
9 MORRELL ST., ELIZABETH 4, N. J.
"THE ORIGINAL MARKING SPECIALISTS"



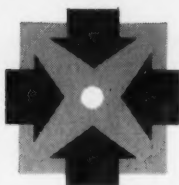
FASTER set-ups and positioning

You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing:* 36" and 50" square or round. *Power rotary and power feed:* 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, write for Bulletin 854.

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO



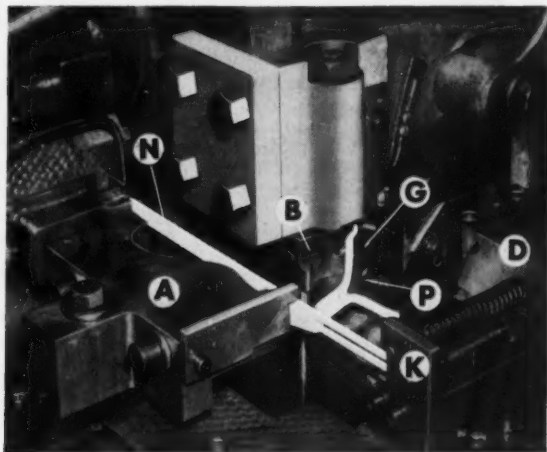
Stand is zinc-plated steel strip 0.05 in. thick by 0.625 in. wide . . . made in steps A, B and C.



Top performance in MASS PRODUCTION

60 vaporizer stands per minute . . . automatically formed in one operation on an A. H. Nilson combination press and 4-slide. Kaz products are proof that clever product design, combined with precision tooling by Nilson, increases production and lowers costs.

Without obligation, Nilson provides specific forming recommendations from detailed information. Send for A. H. Nilson catalogue . . . the first step to increased production.

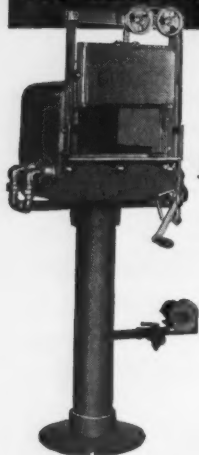


Final step in forming Kaz stands on Nilson 4-slide. Feet are spread, bent, crimped (G) with workpiece (P) on centerpost while next piece (N) is being cut off. Stop (K) on right slide (D) backs off after cut and workpiece (P) is wrapped around centerpost by die (A) when finished part is clear.

A.H. NILSON
MACHINE COMPANY

1514 RAILROAD AVE. BRIDGEPORT 5, CONN.

SAVE HOURS CUT HEAT TREATING COSTS



**Quick Acting
Johnson No. 142
Hi-Speed
Furnace**

Save time, save gas . . . heat treat carbon and high speed steels, dies and tools with the JOHNSON 142. Powerful burners provide fast uniform heat with time saving speed. Gets the job done while other furnaces are still warming up. Temperatures easily regulated with accuracy. Door opens upwards allowing tools to be inserted or withdrawn without fully opening door. Firebox 7" x 13" x 16 1/2" lined with high temperature refractory. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

For temperature range 1300° to 2350° F. \$325.00 F.O.B. Factory

Models available in smaller firebox sizes.

Write for Free Catalog

JOHNSON GAS APPLIANCE CO.

571 E Ave. N.W., Cedar Rapids, Iowa

Since 1901 **JOHNSON**
FURNACES FOR INDUSTRY

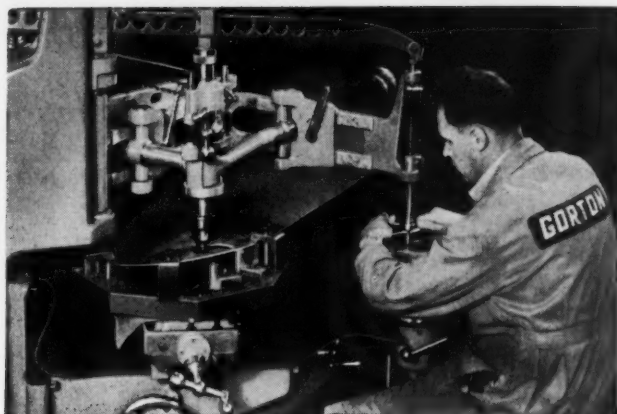
cially in each case. All rebuilt machines will carry a new machine guarantee.

In many replacement programs, a considerable advantage may be gained if the original equipment can be taken in trade. Norton is willing to consider such trades on a limited group of readily salable machines, including 6 x 18 or 30-Inch Type C or CTU; 10 x 18 or 30-Inch Type LC or LCTU; 10 x 18 or 36-Inch Type C or CTU; 14 x 18 or 36-Inch Type LC or LCTU; 10 x 36-Inch Type C Angular; and Type C Multipurpose. Norton is now considering plans for time payments in purchasing new machines. These arrangements will be handled through distributors.

Firth Sterling Trains Distributor Salesmen to Meet Competitive Market

Equipping its distributor organization to cope with today's highly competitive industrial market was the objective of a sales training course held recently by Firth Sterling, Inc., Pittsburgh, Pa. The program consisted of sales courses on tool steels and sintered carbide, utilizing skits to demonstrate how salesmen can meet competition. A "get acquainted" breakfast marked the beginning of the course. Fourteen salesmen, representing nine authorized distributors, attended the course conducted by Firth Sterling sales and technical personnel. In addition to the classroom sessions, the course included tours through Firth Sterling plants and research laboratories, lathe and grinding demonstrations in which the trainees participated and a discussion of Firth Sterling sales promotion, advertising and distributor policies.

Conducting the discussions for Firth Sterling were C. C. Krogh, manager, distributor sales; E. W. Kalb, manager, steel sales; M. L. Backstrom, as-



Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours, 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

Pantography IS NEW —

By George Gorton III
Executive Vice President
George Gorton Machine Co

— in the sense that industry at large and Metal Working people in particular are just beginning to appreciate the many advantages Pantography offers to those faced with the Design-Production problems of today and tomorrow.

INDUSTRY'S foremost responsibility right now is to produce faster, to highest quality standards and at lower cost — whether on defense contracts or for our civilian needs.

Today, there are literally thousands of operations being performed throughout industry which can be speeded up, improved in quality and lowered in cost by the use of available models of special machine tools. The modern tracer-controlled Pantograph machine is such a tool. It is both a special purpose machine, ideal for short runs, and it is an accurate single purpose machine which turns out identical parts or pieces to meet tight production schedules.

The tracer-controlled Pantograph machine is used for inside and outside profiling, routing, die sinking, mold cutting, counterboring, contour milling, chamfering, grooving, graduating and engraving in ferrous and non-ferrous metals, as well as in plastics.

This machine performs on flat, uniformly curved, cylindrical, spherical or

irregular shapes — it works in either 2 or 3 dimensions, in all directions on a horizontal plane, and vertically. It employs enlarged masters, templates or patterns which are quickly and easily made and operates normally at a reduction ratio thereby increasing accuracy — exclusively characteristic of the pantograph.

Single or repetitive accuracy — from one piece to thousands — manual or full automatic operation depending upon quantities — work sizes from the size of a dime to as large as 10 feet.

A new booklet, "Pantography," explains the process and shows what this type of machine can do for you. It is yours without obligation. Write for it today. If interested, also ask for our latest General Catalog 1655. Address the George Gorton Machine Co., 1701 Racine St., Racine, Wisconsin, U. S. A.





Distributor salesmen and Firth Sterling personnel attending sales training course held recently by Firth Sterling, Inc., Pittsburgh, Pennsylvania

Ohio; Fred Zaugg and Frank Hollowell, Topping Brothers. New

sistant manager, carbide sales; J. J. Sowko, manager, Pittsburgh district sales; J. Gabrenas, assistant chief engineer; S. F. Madden, distributor sales; F. Cellier, research; and T. E. Pickering, sales training director. The distributor salesmen attending were Kirke Burdick and Andrew Sidum, Mau Sherwood Supply Co., Cleveland, Ohio; James Smith and William Engle, E. W. Smith Machinery Co., Columbus,

York, N. Y.; W. J. Davis, Wessendorf, Nelms & Co., Boston, Mass.; A. W. Hageman, Wm. S. Bolden Co., Charleston, W. Va.; Joe Passauer, The Cincinnati Supply Co., Cincinnati, Ohio; Floyd Greenwood and Davis Magnuson, W. E. Thew Supply Co., Green Bay, Wis.; Dave Cronan, Toledo Abrasive Supply Co., Toledo, Ohio; and K. F. Jones and J. F. Hauser, Somers, Fittler & Todd, Pittsburgh, Pennsylvania.

Commander TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to $\frac{3}{4}$ " Taps
- Automatic Tap Protection
- Furnished to fit any Drill Press

Commander — "The Tapper That Thinks For Its Operator," has the adjustable full range torque control that instantly stops any tap when it becomes dull, loaded, strikes a hard spot or bottoms in blind hole tapping. Assures maximum tap protection, higher production, even with inexperienced operators.

Your nearby Commander Distributor can give you a demonstration in your own plant. Write for his name and a copy of the NEW Commander Full Line Catalog.

COMMANDER MFG. CO.

4224 W. Kinzie St.

Chicago 24, Ill.



Any operator does precision tapping with a *Commander* TAPPER

Product of *Commander* . . . Builder of the *Multi-Drill*

Whatever kind of gears you make...
Whatever way you make them

National Tool Co.

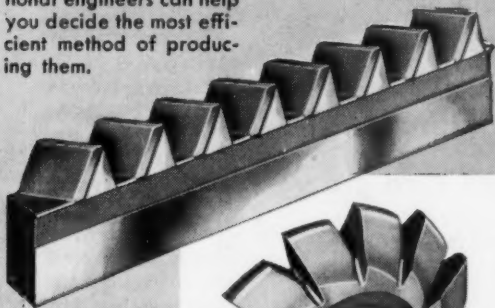
can supply the right type cutting tool
because we make all types

National Tool Co., with 50 years experience in the manufacture of special cutting tools, makes all varieties of gear cutting tools for all types of spur, helical and worm gears—as well as for sprockets and splines. Whatever your gear requirements—large or small—National engineers can help you decide the most efficient method of producing them.

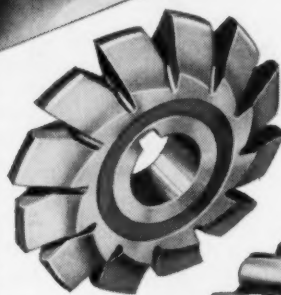


Gear Shaving Cutters

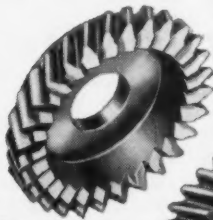
Hobs



Rack Type Gear Shaper Cutters



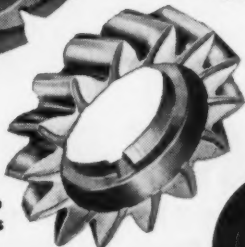
Involute
Gear Cutters



Gear Shaper
Cutters



Master Gears



Herringbone
Gear Cutters

Representatives in major industrial centers

National
TOOL CO.
Cleveland 2, Ohio

Guthery Machine Tool Moves to Larger Quarters

Guthery Machine Tool Corporation has moved from 130 W. 42nd St., New York 36, N. Y., to larger quarters at 38-31 Crescent St., Long Island City 1, N. Y. The firm is the sole occupant of a three-floor building of substantially greater floor area and will consolidate previously scattered departments. The new "home" will take care of expanding business by providing larger quarters for stock rooms, tool

designing and service areas, as well as larger offices and sales rooms. Guthery Machine Tool distributes "Traub" and "Leinen" screw machines and lathes, as well as domestic equipment.

George N. Levesque Receives A.S.M.E. 1954 Machine Tool Award

George N. Levesque, director of research for Brown & Sharpe Mfg. Co., Providence, R. I., received the 1954

Machine Tool Award presented at the annual banquet meeting of the American Society of Mechanical Engineers held recently at the Hotel Statler in New York City. The award was conferred by retiring A.S.M.E. president, Lewis K. Sillcox, honorary vice chairman of the New York Air Brake Company, at an honors ceremony which climaxed the week-long annual meeting. Mr. Levesque's paper, "Testing Methods for Production of Accurate Machine Slideways," was judged the best original paper submitted by a member of the A.S.M.E. on the general subject of machine tool design.

HANNIFIN HAS IT!

The BIGGEST improvement in cylinder design in the last 50 years!

EVERY ENGINEER will want engineering data on these two new lines of HANNIFIN cylinders



WRITE FOR
← **BULLETIN 113**
Hydraulic Cylinders 2000 p.s.i.—3000 p.s.i. (non-shock)

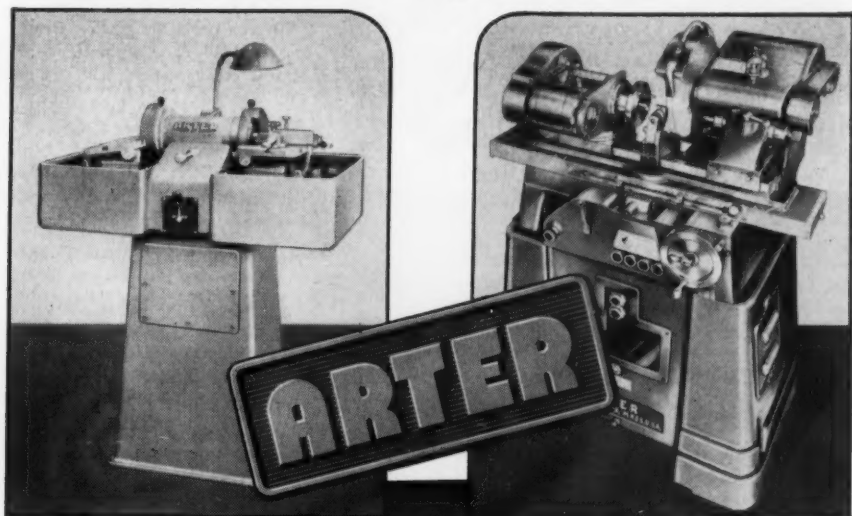
BULLETIN 213 →
Fluid Power Cylinders 200 p.s.i. (air or oil)



HANNIFIN

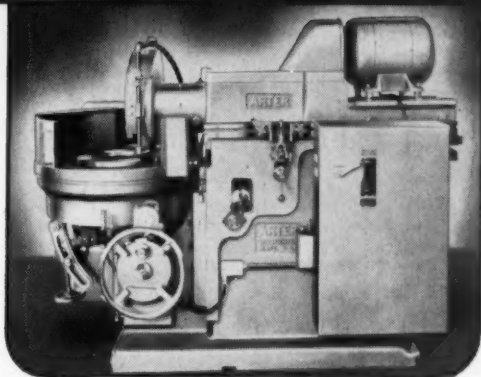
Hannifin Corporation, 565 S. Wolf Road, Des Plaines, Illinois
Air and Hydraulic Cylinders • Presses • Air Control Valves

The Arter Family of Machines



CARBIDE
TOOL
GRINDERS

CYLINDRICAL
GRINDERS
INTERNAL
GRINDERS



ROTARY SURFACE GRINDERS

Chuck Capacity 8" to 40"

The Arter trademark on these machines is the sign of
ACCURACY • POWER • DEPENDABILITY.

Tell our engineers your grinding problems.
They'll find a way to lick them.

ARTER GRINDING MACHINE COMPANY
WORCESTER • MASSACHUSETTS

Agents in industrial centers of United States and Canada



New ultra-modern plant of Wesson Metal Corp., Lexington, Kentucky

Wesson Completes New Ultra-Modern Plant in Lexington, Kentucky

Wesson Metal Corporation has announced the completion of a new ultra-modern, 40,000 square foot cemented carbide metals plant in Lexington, Kentucky. The plant is now in full operation. Announcement of the start of production in the new plant was made by James A. Fraser, president of the firm which produces cemented carbides for metalcutting applications. Mr. Fraser stated that the increasing demand

for the firm's products and anticipated heavy demand for a new development to be introduced in the near future made it necessary to obtain greater space.

The new plant more than doubles Wesson's productive capacity, as well as expands its research and development facilities. In addition to some entirely new manufacturing developments, the company's new quality control laboratories are using the most advanced scientific equipment available. According to company officials,



Platform ideal for dies, fixtures, etc.

3 in one Lift

FAST, SMOOTH HYDRAULIC POWER

Platform, fork and boom are quickly interchangeable to give you a versatile lift with up to 750 lbs. capacity. Operates in aisles narrow as 26". An ideal, all around lift for production, tool room, maintenance, shipping and receiving.



Fork for pallets, drums, crates, etc.

Boom for shop and maintenance.



Ask your distributor or
Write TODAY for full details

UNIT MANUFACTURING COMPANY

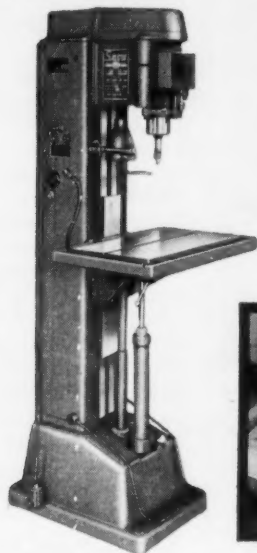
1223 Harmon Place • Minneapolis 3, Minn.

**Quicker changeover,
lower tooling costs...**

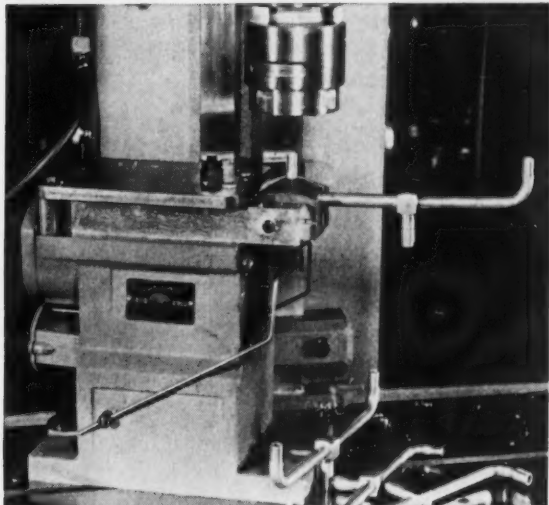
with **SNOW** **FULL
UNIVERSAL
MACHINES**

Basic Master Fixtures for DRILLING, THREADING or TAPPING. Snow universal machines are the most flexible, most efficient, and most economical known. They save countless dollars in change-over time — help you start jobs sooner — assure quality at high production rates.

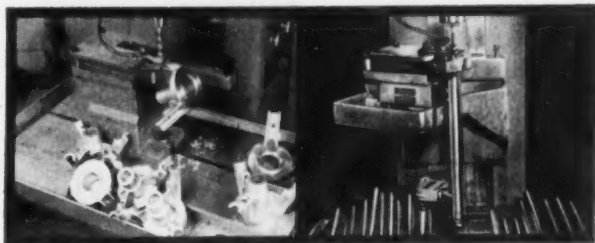
The square footage under a Snow Machine in your factory can be the most profitable in your whole plant. Submit details of your requirements.



**ELECTRICALLY OPERATED
AIR CONTROLLED
AUTOMATIC OR
SEMI-AUTOMATIC**



AIR VISE holds part firmly — self-centering — always in exact position for precision work. U-shaped wire underneath provides quick finger-tip control, automatically starting spindle cycle. Jaw inserts keep tooling costs at minimum. Blank jaws always in stock — can be tooled to fit your part promptly, inexpensively.



Irregularly shaped parts are easily handled. Front feed permits close setting of guide plate for greater accuracy with high production.

Here a short **AIR VISE** mounted on an offset table holds long tubing. Piece-part switch under table automatically closes vise and starts tapping operation.

SNOW MANUFACTURING CO., BELLWOOD, ILL.

(Suburb of Chicago)

the extensive research and development of several new Wessonmetal carbide steel cutting grades, started in the company's previous plant, will be continued.

Detroit Die Set Completes Addition to Manufacturing Plant

A major addition to its manufacturing plant has been completed by Detroit Die Set Corp., Detroit, Mich., in order to increase production capacity

for both special and stock die sets. The company's expansion program for 1955 includes extension of plant space, installation of new equipment and rearrangement of facilities for better production flow.

A.I.T. Diamond Tool Constructs Large, Modern Plant

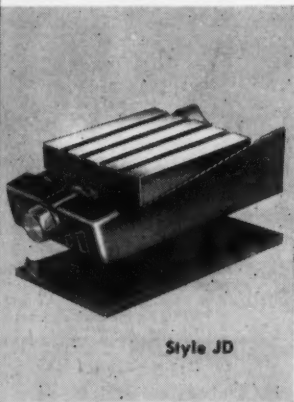
A.I.T. Diamond Tool Company has announced the construction of a large, modern plant designed for the manu-

facture of diamond wheels and tools. The new plant is located in the fast-growing industrial area of Skokie, Illinois, a suburb of Chicago, at 8221 North Kimball Avenue. With the additional space, not only will larger tools be manufactured, but a more extensive experimental program will be carried on. Both offices and factory are maintained in the new building, and spacious parking facilities for visitors and employees are available. The three associates of the company, Albert J. Stern, Irving G. Stern and Theodore J. Stern, will be maintaining sales and production of the plant as before, but on a larger scale.

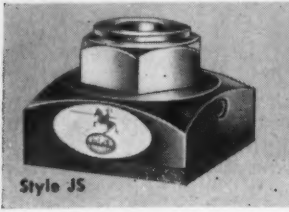
CUT MACHINE MAINTENANCE COSTS with **EMPCO** leveling jacks

EMPCO Leveling Jacks cut down on set-up time and keep maintenance costs to a minimum! They provide a solid, level support for machine tools, assembly fixtures, industrial furnaces, and all types of production equipment. Machines leveled with EMPCO Jacks are easily installed and relocated—maintain new-machine performance longer! Equipment can be re-leveled in a matter of seconds by a simple turn of the hex screw.

VI-SORB Mounting Pads are optional with EMPCO Jacks. They control vibration from within the machine itself, and reduce transmitted vibrations.



Style JD



Style JS

Available in two styles and 6 models, there's an EMPCO Jack for your every requirement. Write today for complete information and illustrated bulletin!



THE ENTERPRISE MACHINE PARTS CORPORATION

2715 JEROME AVENUE

DETROIT 12, MICHIGAN

ASK YOUR DISTRIBUTOR ABOUT:



The BIG WHEEL... In The Time Savings Department

Actually, your distributor has *more* than one "big wheel" to help you achieve finishing time savings you've always hoped for! With Brightboy you may save as much as 50% over methods you're presently using.

Ask your distributor about these "big wheels" in new, time saving *stock grains and textures* "matched" for jobs where savings count most.

For example: Suggested above is a new rubber-cushioned Brightboy wheel compounded with silicon carbide. You don't have to be told about the finishes that a grain like this gives. But the combination-action of the abrasive *plus* rubber is really something you ought to see!

Rubber-cushioned Brightboy wheels are now available in either aluminum oxide or silicon carbide grain. *And*, each of these uniform texture combinations comes in *grain sizes* ranging from extra coarse to

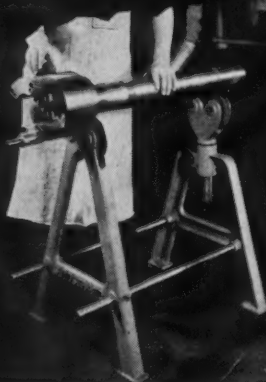
extra fine, in soft, firm and tough rubber binders.

QUICK DELIVERIES! Your Brightboy distributor will recommend exactly the grain and texture you need. He can supply you right from stock, or get the wheels you want pronto. Write us on any problem where finishing is involved.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives



Balancing Tools for a Wide Range of Work



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

CAPACITIES		
Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

FREE DATA



You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin 552.



SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

Abrasive and Metal Products Company Purchases Sterling Abrasives

Announcement has been made that the name of The Sterling Abrasives Division of The Cleveland Quarries Co., Tiffin, Ohio, has been changed to Sterling Grinding Wheel Company. Sterling is now being operated as a wholly-owned subsidiary of the Abrasive and Metal Products Co., Detroit, Mich. No change in personnel is contemplated. It is pointed out by Sterling management that the company's position in industry has been greatly strengthened.

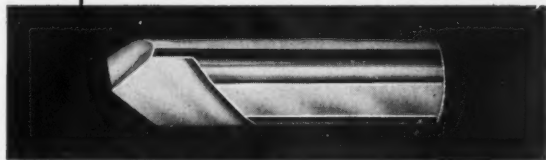
D & M Guard Moves to Kenmore, New York

D & M Guard Company, manufacturer of automatic punch press guards, formerly located in North Tonawanda, New York, has moved to its new factory at 889 Military Road, Kenmore, New York. The company has also announced the purchase of the Flohr automatic saw and jointer guard business from the Flohr Manufacturing Company of Buffalo and has moved this business to its Military Road site, thereby combining the manufacturing operations of these products.



ATRAX

IN ACTION



RECORDS SHOW 500% INCREASE IN PRODUCTION WITH IMPROVED BORING TOOL BIT

A CASE HISTORY: One of our customers had experienced considerable difficulties in boring tapered holes in stainless steel. The specifications called for extremely close diameter and taper tolerances, and a finish requirement of ten micro-inch. The carbide tool previously used gave the customer a production of one piece part, containing eight holes, per eight-hour day. With the new Atrax superior finish ground boring bit, production increased to about five piece parts per day. One tool bit roughed out and finished eight holes before resharpening was necessary, and the finished product was eight micro-inch or better. Atrax Solid Carbide Tool Bits improved production in this instance by over 500%.

Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

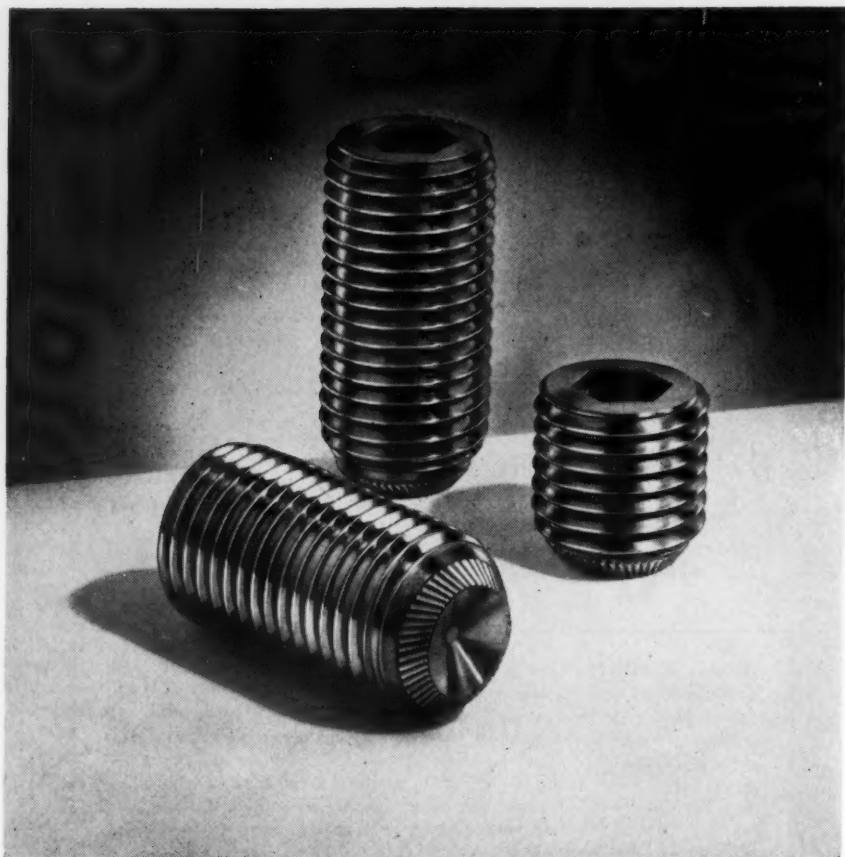


**NEW! Complete 88-page Manual and Catalog
of Carbide Tools. Write for your free copy.**

THE ATRAX

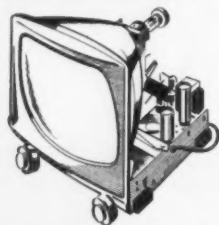
COMPANY

NEWINGTON 11,
CONNECTICUT



UNBRAKO SELF-LOCKING SOCKET SET SCREWS feature the following advantages: knurled cup point that won't work loose; accurate hex socket for nonslip,

positive drive; fully formed threads—Class 3 fit; heat treated alloy steel for strength; standard sizes—#4 to 1"—in a full range of lengths.



USE UNBRAKO's wherever ordinary cup point set screws are used. On radios, television sets and electronic equipment.



On refrigerators, washing machines, and other household appliances.

9 times out of 10 a standard UNBRAKO will do the job

A special socket screw may not be necessary, a standard UNBRAKO usually does the same job—much cheaper. Your local industrial distributor stocks Standards. He gives immediate attention to your requirements, and such extras as special delivery to your plant. Write for UNBRAKO Standards. STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.



SOCKET SCREW DIVISION



On power mowers, power saws and other power tools.

SPS
JENKINTOWN PENNSYLVANIA



UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

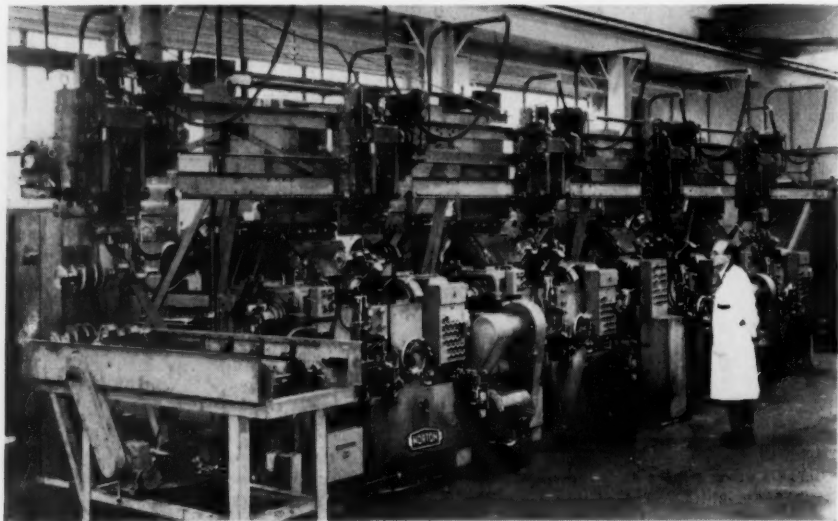
new shop equipment

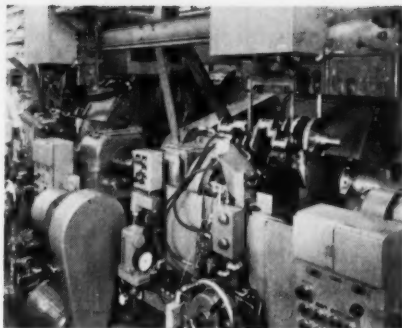
Crankpin Grinder Is Automated

What is believed to be the first automated crankpin grinder ever made has been announced by Norton Co., Worcester 6, Mass. Identified as the Transfer Type Crankpin Grinder, the machine is designed to pick up a crankshaft from a conveyor line; automatically locate the work in four successive grinding stations where the

crankpins are ground to close tolerance limits; and place the finished work on a conveyor to be carried to the next operation—all without human effort. The estimated production rate of the machine is one complete shaft per minute throughout the entire working day. Because there is no human fatigue factor involved, the machine can be expected to maintain

Overall view of Norton Automated Transfer Type Crankpin Grinder taken during construction. The operator is standing in front of central control station which controls all units of the machine.





Closeup view of one of the four grinding stations of the Norton Transfer Type Crankpin Grinder

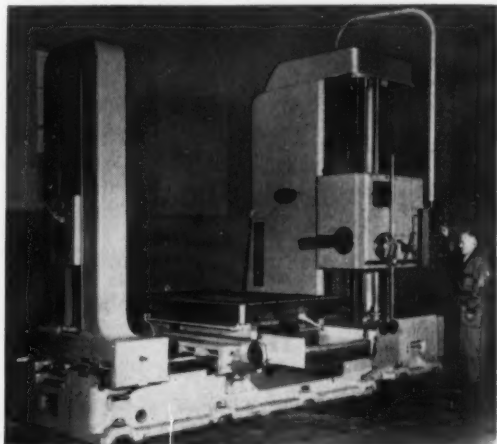
h.p., d.c., variable speed motors drive the 42-in. crankpin grinding wheels at a constant peripheral speed. Two 5-h.p. motors drive the four work heads. Other motors operate the hydraulic equipment and transfer mechanism.

a preset production rate all day. The floor space required by the machine is 22 x 45 feet.

For grinding V-8 shafts with four pins, two base units, each mounting two grinding wheel slides, are required. A transfer unit is mounted over the four grinding stations. Cabinets for hydraulic and electric controls are located behind the machine for easy maintenance. The grinding units utilize many Norton features, including wheel spindle bearing construction and automatic wheel guard mounted truing with automatic compensation for wheel wear. Air-operated gages, which measure the pin diameter during grinding, control the in-feed of the grinding wheel. All electric and hydraulic controls are easily accessible, and all terminal ends are clearly numbered for ease in trouble shooting and reassembly in the customer's plant. Lubrication of the machine is accomplished automatically through a built-in lubrication system. Twelve electric motors are used. Four 25-

Boring, Drilling and Milling Machine Features Pendant Control

The Bullard Co., Bridgeport, Conn., has announced the Model 75 Table-Type Horizontal Boring, Milling and Drilling Machine which features a pendant control. All functional controls of the machine are operated from a movable pendant station; that is, directional feed and traverse control of the spindle, head, table and saddle, selection of feed and speed rates, spindle direction of rotation and head binders. A unique feature of the pendant is that the operator actuates directional levers for any required feed and traverse motion instead of the conventional push-button operation. Accord-



Bullard Model 75 Table-Type Horizontal Boring, Milling and Drilling Machine

ing to the manufacturer, a screw and a rack feed for the spindle makes possible a smooth, steady power feed for boring, as well as a sensitive hand feed action for small drilling and tapping. The selection of the type of feed desired is said to be an unusually simple operation, actuated by means of a selector switch on the front of the head.

The weight and proportions of the head post and head are considerably greater than the previous model. The

head post is a massive box section for its full height, providing maximum rigidity for the head at its highest operating position. The result is said to be less head deflection and greater ability to absorb shock, enabling the machine to take heavy cuts and feeds without sacrificing accuracy. An optical measuring device is provided for the head and table, enabling the operator to quickly and accurately set the head or table to any desired position.

Other standard features of the Model 75 include feeds in inches per revolution and inches per minute for all motions, automatic depth knockout for spindle, hydraulic counterbalance for head and massive rear post for supporting extension boring bars. Accessories, such as continuous feed facing heads, right angle milling attachments, thread cutting attachment, coolant system and boring bars of all types, are available as extra equipment. The machine is available in three sizes; namely, 3, 4 and 5 in. diameter spindles with a wide range of head post heights, bed lengths and table sizes.



**DRILL and
PILOT
BUSHINGS**
*Frictionless
—Rotary—*

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch. Write for details.

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

**Monarch Precision
SHAPLANE
Radius Tools**

Patent Pending



**Five Models for
LATHES, SHAPERS, PLANERS,
AND BORING MILLS.**

RANGE 1/2" TO 3" RADIUS (MODELS ALSO AVAILABLE FOR CONVEX CUTTING, AND CONCAVE RADII TO 6" ON PLANERS, ETC.)

**C. B. TEETER
Tool Room Specialties**

4470 Oakenwald Ave., Chicago 15, Ill.
Phone Drexel 3-3571

Automatic Electric Control Is Available for "Chicago" Press Brakes

Dreis & Krump Mfg. Co., 7418 S. Loomis Blvd., Chicago 36, Ill., has announced an automatic electric control for its line of "Chicago" press brakes.

AT LAST!

A Low-Priced Dial Type Indicator
Has 2 contacts 1/32" threaded within 1/4". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts —

Black Penrate . . . \$8.95
No. 4 Superior Magnetic Base and Indicator Holder . . . \$8.95

Thousands of satisfied customers!

SUPERIOR INDICATOR CO.
P.O. Box 734, Rochester 3, N. Y.

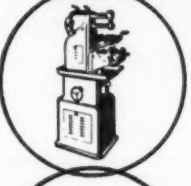
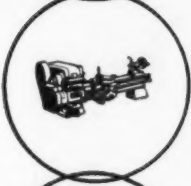


Patented

SHELDON

CHICAGO

U. S. A.



Write
for Catalog



OFTEN PAYS OUT ON THE FIRST JOB...

and gives additional years of "cost free" service.

In the past, lathes were generally bought as large and as heavy as possible to insure accuracy and sufficient power. Now, with accurate, low-cost Sheldon Precision lathes, it is more profitable to buy these faster, cost-cutting lathes for the specific job at hand just as you would buy jigs and fixtures.

In savings of tooling costs, operator cost, power cost, and plant loading, as well as extra profits from more pieces per hour, Sheldon lathes often pay back their cost on a single run.

Sheldon lathes will work to the closest tolerances—have "Zero Precision" Taper Roller Bearings. They can take a healthy cut when operating at high speed direct drive—have double V-belts to the spindle. They will swing 10", 11", or 13" and have a 1 3/8" hole through the spindle—have sufficient capacity for the great bulk of lathe work. Sheldon lathes have created a new factor for figuring machinery costs. They are tools you should know about.

SHELDON MACHINE CO., Inc.

4250 N. Knox Ave.

Chicago 41, Illinois

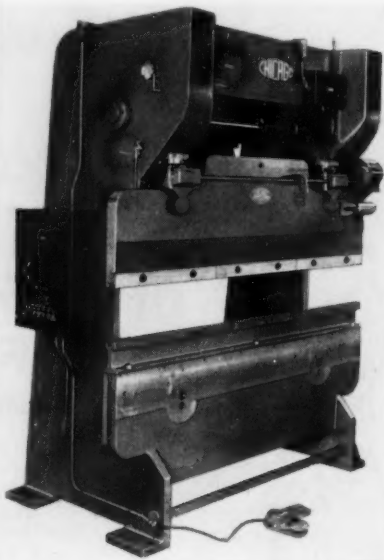


Send for Woody Spencer's Handy Tapping Guide . . . all arranged for quick, easy tapping reference. IT'S FREE! Hangs on wall or lies flat on desk.

The Wood & Spencer Company

1934 E. 61 ST. • CLEVELAND 3, OHIO

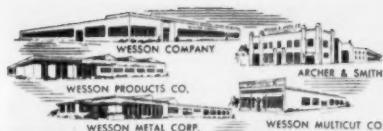
The control unit consists of a foot switch which replaces the standard foot lever, a solenoid for operating the clutch, an automatic switch box and a control panel. The control panel, through individual switches, permits setting the machine for inching; inching-nonrepeat, inching down-self return-nonrepeat; inching-preset stop; inching-preset stop-nonrepeat; double



Dreis & Krump "Chicago" Press Brake equipped for automatic electric control

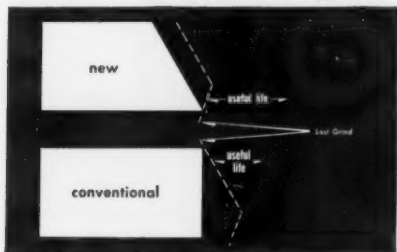
clutch-preset stop-nonrepeat; and one or two-man operation.

According to the manufacturer, the automatic control increases production on all types of press brake work, eliminates whipping and work spoilage due to kinking and reduces operator fatigue to a minimum. The predetermined stop is said to provide maximum safety for the operator. By the use of two foot switches, the press brake can be operated by two men working together.



carbide NEWS

Carbide Tip Waste Cut 30%



Wesson milling cutter blade design has base parallel with peripheral cutting edge; permits more regrinds per blade

Reduction in carbide waste is assured by the new milling cutter blade, at top, since base of carbide tip parallels the peripheral cutting edge. Conventional blade is shown below.

A new carbide-tipped milling cutter blade design now incorporated into the Wesson Rigidicut milling cutter line is producing an increase of 30% or more in blade life.

Tipped with Wessonmetal carbides, the new blade permits maximum carbide usage and enables many more regrinds per blade.

The new blade design is compared with old style blades in the sketch at the left. In the new blade, the base of the carbide tip is parallel with the peripheral cutting edge, eliminating waste.

Because of the success of the new design in extensive field application tests, it is now standard in most Rigidicut cutters in the fine pitch and coarse pitch series. Additional economy results since these blades are being made available at no increase in price.

Complete engineering data and price information on the entire Rigidicut milling cutter series is available from Wesson Company, Dept. AD, 1220 Woodward Heights Blvd., Detroit 20, Michigan.

Wesson Metal Now In Top 3

With the official opening recently of a new and modern carbide plant in Lexington, Ky., Wesson Metal Corporation entered the ranks of the three largest carbide manufacturers in this country. A model of scientific design, the new Wessonmetal plant occupies over 40,000 square feet of manufacturing space.

In the new plant, greatly expanded research and development facilities will highlight continued development of new carbide metal-cutting grades. The company's quality control laboratories contain some of the most advanced scientific equipment available.

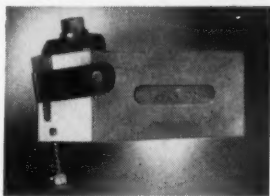
The new plant, which houses some entirely new manufacturing and quality control developments, will more than double the productive capacity of previous facilities. Working at virtually full capacity already, the new plant is keeping pace with wide-spread demand for the complete line of Wessonmetal carbides.

A substantial portion of the plant's capacity is being devoted to output of the latest Wessonmetal development in steel cutting grades. The new steel cutting grade promises to be the most significant carbide development since the introduction of steel cutting carbides.

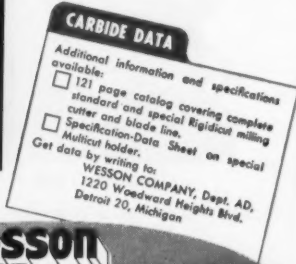
New Multicut Holder Gets Peak Efficiency From Fischer Lathes

Popularity of the Fischer copying lathe springboarded the development of a special band-type Multicut tool holder. Coupled with the steel band used on all Multicut holders is a new top clamp that assures rigidity of insert when the tool is recessing or going through the out-facing cycle.

Combination of band and clamp permits closer tolerances and finer finishes in the complete range of Fischer lathe applications. Finish turning is eliminated in many operations. The holder uses standard Wessonmetal D-55 inserts.



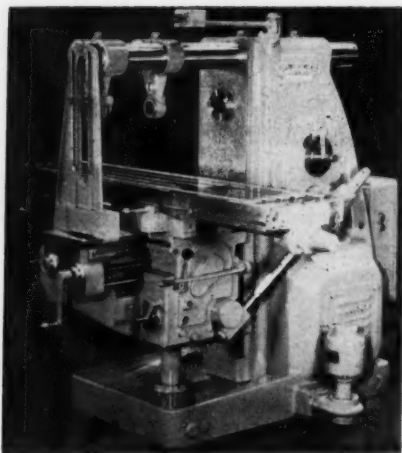
Closer tolerances and finer finishes result from band and clamp used in Multicut holder.



Milling Machine Combines Ample H.P. with Simplicity and Precision

Identified as the Model CE, a milling machine which is said to combine an ample range in horsepower with simplicity and precision has been announced by Kearney & Trecker Corp., Milwaukee 14, Wis. Offered in both plain and universal styles, the machine provides ease and economy of operation.

At the present time, the Model CE



Kearney & Trecker Model CE Milling Machine



Make **3**
hammers
AT ONCE!

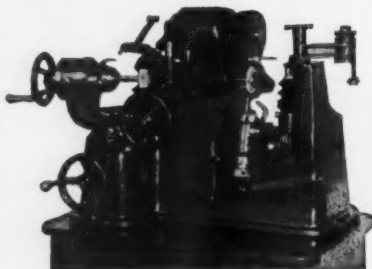


It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

Write for circular and prices
LAWRENCE H. COOK, INC.

67 MASSAHOIT AVENUE, EAST PROVIDENCE 14, R. I.

HYBCO TAP GRINDER



MODEL 1100

- Capacities No. 0 Machine Screw to 1 1/2" Hand Taps.

HENRY P. BOGGIS & CO.

708 East 163rd Street
Cleveland 10, Ohio

machine is available in either a No. 2 (3 h.p.) or a No. 3 (7 1/2 h.p.) size. Each size features 16 quick-change speeds, ranging from 25 to 1,300 r.p.m., and feeds ranging from 1/2 to 25 i.p.m. The machine, it is claimed, is ideally suited for a wide variety of applications, especially for small tool shops, repair and maintenance shops and vocational training schools.

2,000-Ton Hydraulic Press Trims Large Aluminum Forgings

An unusual 2,000-ton hydraulic press, shown in the accompanying il-

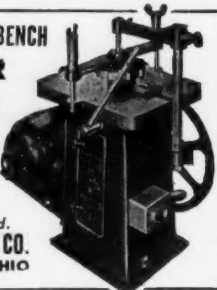
READING BENCH KEYSEATER

Portable—move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work.

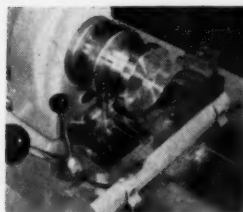
Low first cost—prompt delivery.

Good dealers wanted.
READING MACHINE CO.
CINCINNATI 37, OHIO

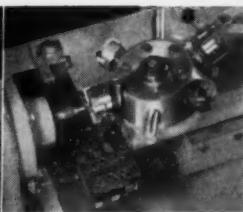


HARDINGE
ELMIRA, N.Y.

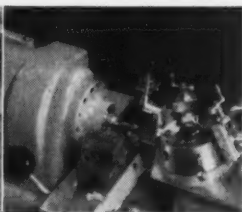
NEW Variable Speed Machine for **PRODUCTION DEPARTMENTS**



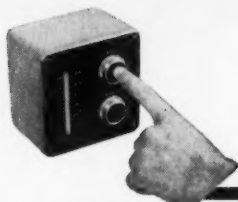
Large Work



Threading



Small Work



**Simply Push a Button
for
Exact Spindle Speed**

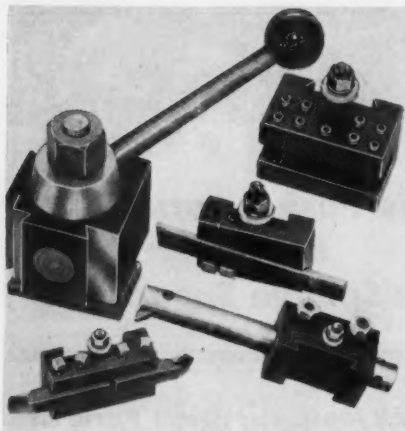


**Produce More Precision Parts at
Lower Cost with this
NEW Second Operation
Machine**

Send for Free illustrated
Bulletin DSM59

HARDINGE BROTHERS, INC. ELMIRA, NEW YORK, U.S.A.

GET THE MAXIMUM from your lathes by using the **ALORIS "Quick Change" TOOL POST**



Only a second to change tools for turning, facing, drilling, boring, reaming, cutting off or any other operation.

- GREAT REPETITIVE ACCURACY.
- RUGGED CONSTRUCTION.
- TESTED AND RECOMMENDED BY LEADING LATHE MANUFACTURERS.

Patented

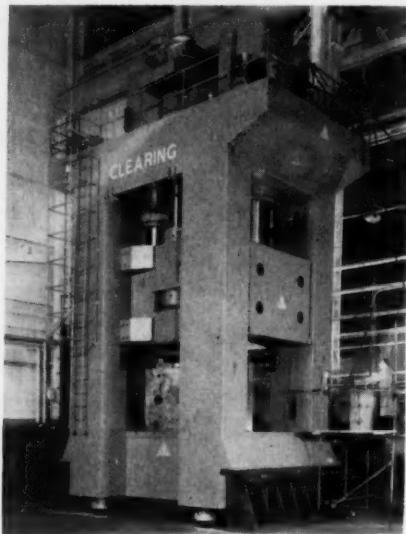
Ask your dealer for a demonstration, or write for catalog today.

Some open territory still available for representatives.

MANUFACTURED BY
ALORIS TOOL CO., INC.
131-37 SANFORD AVENUE
FLUSHING 55, N. Y.

illustration, which is designed to trim massive aluminum forgings has been developed by Clearing Machine Corp., Division of U. S. Industries, Inc., 6499 W. 65th St., Chicago 38, Ill. The machine is of the housing type with pre-loaded tie-rod frame construction which is claimed to resist the effects of off-center loading.

A unique system for taking care of "break-through" shock is built into the press. When the slide presses through



Clearing 2,000-Ton Hydraulic Press

the work during the last portion of the work stroke, it also presses against a cushion cylinder. The cushion cylinder, designed to withstand full press tonnage, is said to reduce the pressure setting by exhausting its volume through a fixed orifice. When the slide breaks through the work, the hydraulic system is decompressed gradually. According to the manufacturer, the cushion restrains the movement of the slide as it attempts to accelerate and continue its stroke.

**SEND FOR
FREE CIRCULARS.**

**MATTISON
HIGH-POWERED
PRECISION
SURFACE GRINDERS**



• Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.

They are built with table sizes from 12" to 36" wide by 36" to 192" long.

**WIDE ABRASIVE-BELT
GRINDING and POLISHING MACHINE**

• From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.

MATTISON

MACHINE WORKS

ROCKFORD • ILLINOIS

Milling Cutter Features Carbide-Tipped Inserted Blades

A milling cutter combination, consisting of a specially-designed cutter body and inserted Blades which are carbide tipped and form relieved to reproduce serrations in such items as inserted blades of milling cutters, boring bars, counterbores, spotfacers and reamers, has been announced by Fenton Carbide Tool Co., Inc., Linden, Mich. The serrated cutting tips of the

inserted blades employed in the cutter combination is believed to be one of the first carbide applications for this kind of work. According to the manufacturer, the Carboloy Grade 78B carbide used to tip the inserted blade requires minimum regrinding to maintain the serrated teeth in sharp condition, reproducing precise serrations.

The cutter body is $3\frac{1}{4}$ inches o.d. and $1\frac{1}{2}$ inches wide. The eight inserted blades are mechanically held. The

cutter combination is constructed so blades can be removed and replaced without indicat-

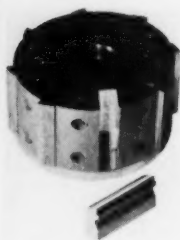
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Morton **FIXTURE CLAMP** and or **COMPONENT TO FIT YOUR** **MOST** *Exacting* **REQUIREMENTS**

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Fenton Milling Cutter Combination with one carbide-tipped inserted blade extracted

ing or grinding in assembly. Also, the same cutter body can be used to make various size and pitch serrations, merely by changing blades. This same principle of inserting blades without indicating or grinding in assembly, it is claimed, can be adapted to carbide form cutters.

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Simplifies and speeds inspection of parts, even those difficult to approach. • Measurements read directly from graduated reticle. • Operates entirely on optical principles—no physical contact with part required—precision is independent of the operator.

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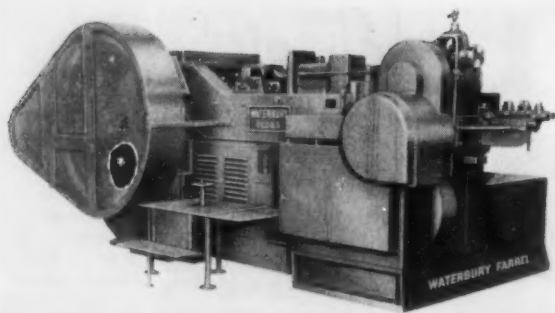
- Can be adjusted in fractions of 1/10,000" on the full diameter as easily as reading 1/16" on a steel rule. *Not a vernier or scroll adjustment.*
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MM-1



Waterbury $\frac{1}{2}$ Inch Solid Die
Double-Stroke Header

Machine Produces Headed Blanks up to 6 Inches Long

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., has developed a $\frac{1}{2}$ -in. solid die double-stroke header which is designed to produce headed blanks up to 6 in. long from an 8-in. maximum wire cutoff at 80 blanks per minute. The manufacturer states that shorter blanks, up to $3\frac{1}{2}$ in. long, can be headed at 100 blanks per min-

ute. The machine is available in both long and short stroke models, with the crankshaft throw the only difference in construction. The long stroke model can produce both long and short work at the rate of 80 blanks per minute. Blank maximum capacity is equal to a blank $\frac{1}{2}$ in. in diameter and 6 in. in length under the head. Maximum length of wire cutoff on the long stroke machine is 8 inches.

The short stroke model operates at a production rate of 100 blanks per minute. The maximum blank capacity is equal to a blank of $\frac{1}{2}$ in. in diameter and $3\frac{1}{2}$ in. in length under the head.



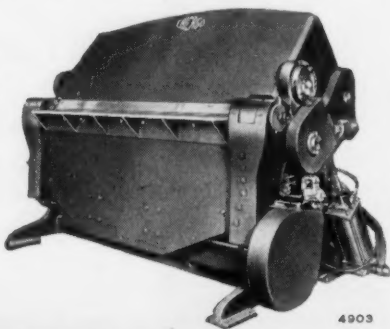
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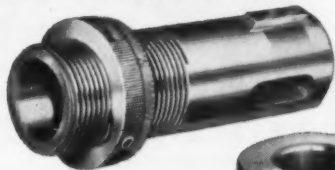
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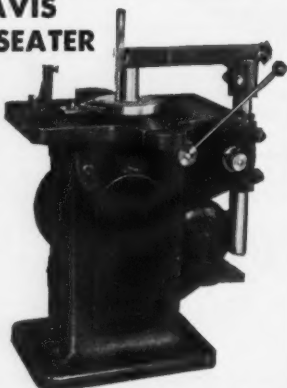
Maximum length of wire cutoff on the short stroke model is 5½ inches. In operation, wire is fed from a coil by a positive roll feed to the cutoff. The cutoff consists of a pair of thick blades held in slides to assure a clean, square cutoff. Wire blanks are then transported from the cutoff slides to the heading die by an independent transfer mechanism. After being headed, blanks are ejected from the heading die by a knockout mechanism. Acces-

sible adjustments are provided to compensate for wear and to retune the mechanisms when desired. Filtered, automatic lubrication is employed throughout the machine, with force feed to stations requiring full flow and metered systems to those requiring less oil. Punch knockout, timed ejector and knockout relief mechanisms can also be supplied with the machine.

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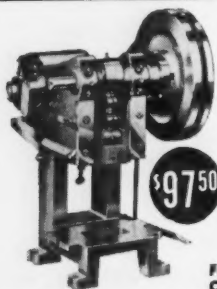


DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

Transfer-Type Machine Tool Features "Sectionized Automation"

To minimize production losses during periods of down time, The Cross Co., Detroit 7, Mich., has announced the development of "Sectionized Automation," based on the division of a machine into sections to permit shutting down some of the operations without interrupting the production of others. This new development is being introduced on a five-section Transfer-matic which is 350 feet long and performs 555 operations on V-8 cylinder blocks. The unit does all of the drilling, chamfering, tapping, camshaft boring and miscellaneous milling on these parts at a rate of 100 pieces per hour at 100 per cent efficiency. More than 100 pieces are in process simultaneously. The only direct labor is said to be the operator at Station 1 who positions the parts and initiates the cycle by push-button. From there on, the blocks are transferred, posi-



CUT COSTS with ALLEN Punch Press

2-Ton Power Bench Type . . Powerful, Dependable, Economical

For light work—stamping, forming, riveting—metal, fiber or other material.

Overall height 19½" . . . Base size 9" x 8¼" . . . Die bed 6¼" x 8" . . . Ram face 1½" x 3½" . . . Ram stroke ¾" . . . positive ¾" ram adjustment . . . sturdy, single pin, non-repeat hand lever clutch . . . V-belt drive . . . weight 105 lbs.

The machine of a thousand uses! Adequate for many types of work now done on large presses at greater expense. Requires only ½ HP motor.

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PART FEEDER

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Single & Multiple Spindle Magazine Feed Power Screw Driving Machines

For driving screws faster in products assembled with screws. These machines operate easily and require very little attention or adjustment when put in production.

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JIG BORERS

for large jobs...
put small
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The Linley Jig Borer provides the means . . . at very low cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.



Specifications

Table Movement:
6" x 10"

Table Size:
7" x 17 1/2"

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As many as 250 Milling Cutters, Slitting and Screw Slitting Saws .015" thick can be sharpened at one time with a variation, plus or minus .001" of exact diameter for entire lot. Automatically indexes the gang of saws, one row of teeth at a time.

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Cross 350-Foot Transfer-matic for machining V-8 cylinder blocks

tioned, machined and inspected automatically in 104 stations.

An important part of "Sectionized Automation" is the Cross Machine Control Unit, seven of which are conveniently placed throughout the ma-

chine. They are equipped with Cross Toolometers to program the operation of all tools. Every time a part is produced, the hands of the Toolometers, which are electrically interlocked with the machine cycle, index counterclock-



PERFORMANCE!

Modern industry demands TOP PERFORMANCE plus Economy from its production facilities. Both of these features are highly exemplified in this Standard Machine No. S. O. 4132.

Standard's 3 column hydraulic drilling, Counterboring and Taper Reaming machine is equipped with three Standard 25 H-P "DRILL-MASTERS," each column has 14-spindle head with tooling to suit successive operations. Fixtures are moved from station to station on a roller type conveyor. PART; SPROCKET. Operations: Drill, counterbore and Taper Ream Holes.

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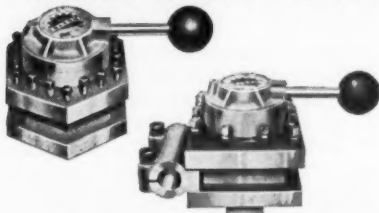
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Does not raise up when indexing in all
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Weight 12 ounces;
length 6¼ inches;
chuck size ¼ inch.
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The RPM's stay up while
grinding . . . not only when the
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High speed grinding with small
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It was born out of a pressing need
in our tool room. Because tool
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to utilize Kipp grinders in your
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MODERN MACHINE SHOP 253

wise. When one of the hands reaches its zero position, the section of the machine which it governs becomes inoperative. Thus, Toolometers are the automatic control devices which cut the sections in and out of operation, as needed, for tool changes. In addition to the tool programming function, the machine control units also provide storage space for two sets of spare tools and tool setting gages for presetting every tool in the machine.

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The IMPROVED Compound Lever Shears

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No. 1 cuts up to No. 11 gauge strip or sheet
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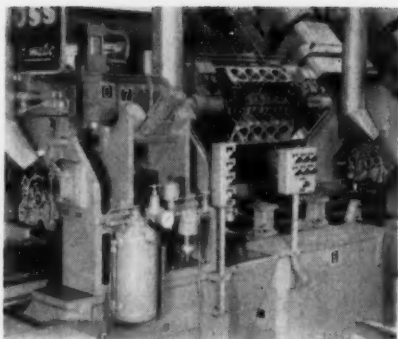


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One of the many automatic inspection units for checking bank faces in the Cross 350-Foot Transfer-matic

Tools are close at hand and ready for use when needed. Preset tools, it is claimed, eliminate the lost time normally required for trial cuts and machine adjustment. They are also said to minimize tool breakage due to improper setting.

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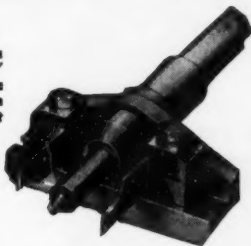
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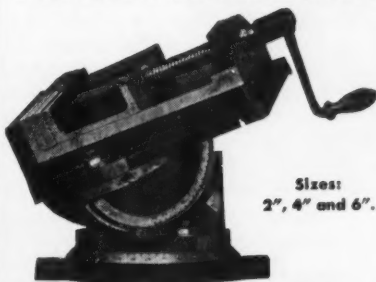
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USE AT TEMPERATURES UP TO 1650° F.



A

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A — Shows unprotected milling cutter hardened in muffle furnace.

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unit is equipped with a special ratchet mechanism which enables it to roll up stairs step by step as the operator pulls a cable drive. Two-wheel safety brakes, designed to afford perfect control at all times, are incorporated in the truck to help prevent accidents when descending ramps or stairs with heavy loads.

Other features of the truck, such as interchangeable shoes, sealed ball bearings and steel tube construction, are said to assure load flexibility and a long efficient life. The truck

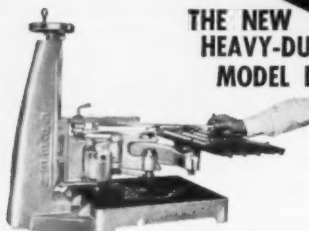
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THE FAMOUS
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THE NEW
HEAVY-DUTY
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The three-dimensional bench Model 106 cuts costs — engraves, routs, models and profiles, giving you expert results even by unskilled workers.

The Model D-2 two dimensional heavy-duty Pantograph is a precision machine with a multitude of new features. Open on three sides, it permits complete freedom for engraving, milling, profiling large panels (up to 30" in diameter) or bulky pieces. Single, micrometer adjustment controls vertical depth of cut, automatically adjusting copy table with pantograph. Range of reduction ratios from 2-to-1 to infinity! Vertical range over 10 inches!

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is equipped with large pneumatic tires which add to ease of operation and eliminate any marking of steps. The unit is available in six different models for handling various sizes of loads, including a special barrel cart and a complete welding cart.



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FOR HIGH SPEED STEEL (15° Rake)	Model 60	61	62	64
SIZE:	0	1	2	4
	1/8" to 5/16"	3/16" to 3/8"	1/4" to 1/2"	5/16" to 5/8"
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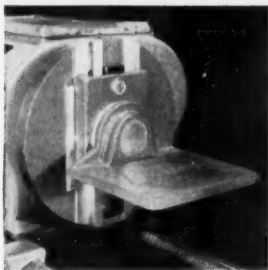


SCHULTZ & ANDERSON CO.

113 Edison Place, Newark 5, N. J.

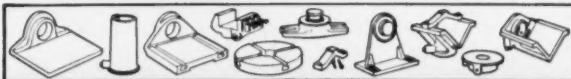
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- SAVES TOOLING COSTS
- SAVES HOURS OF SET-UP TIME



Tooling up for a new product or special machining job is expensive, and often consumes priceless production time as well. Now MICRO-CHUCK eliminates this by offering a universal work-holding assembly that can be used time and time again for tooling up all different kinds of work such as castings, forgings, or odd-shaped parts. MICRO-CHUCK fits right on your present lathe, or use attachments on other machines such as drill presses, grinders, shapers, boring and milling machines. Work is brought quickly and securely to exact spindle center with two simple adjustments, and can even be used for eccentric machining operations.

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Batavia Pike • Newtown, Ohio
In Greater Cincinnati, The Machine Tool Center of The World

All-Purpose Tool Holds Various Regular and Odd-Shaped Workpieces

Designated as the "Micro-Chuck," an all-purpose universal work-holding tool which can be used time and time again for holding all sorts of different regular and odd-shaped workpieces has been announced by Micro-Chuck Division, Scott-Browne Corp., Dept. 154, Newtown, Ohio. The adjustable, precision Micro-Chuck and adaptor at-



Illustration showing Scott-Browne "Micro-Chuck" Universal Work-Holding Tool mounted on lathe and equipped with three-jaw chuck attachment. V-plate, L-plate and T-slot attachments are also shown.

Sensational new VIBRA-FORGE* principle assures unbreakable welds every time!

BREN WELD

PORTABLE BAND SAW BLADE WELDER

...With Built-in Grinder
3/4" capacity



If you've been troubled with band saw blade breakage investigate this Bren/Weld unit built on the new Vibra-Forge principle. It gives you:

- PERFECT WELDS.
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- NO FAILURES.
- WEIGHS ONLY 35 LBS.
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- UNCONDITIONALLY GUARANTEED.

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SALES DIVISION
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Integrity Since 1919
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tach directly to the spindle of a lathe. The face of the unit contains a boss on a slide to which various work-holding attachments can be securely locked. The work, such as castings or stock to be turned, drilled or faced, is then easily clamped onto the attachment. As the attachment can be adjusted through a full 360 degrees on the boss, and the boss in turn can be moved up or down the face of the Micro-Chuck on the slide, any point of the workpiece can thus be brought quickly to exact spindle center. After the work is set in position, the unit is securely locked into place so that the work is held rigidly.

Various attachments are available for use with the work-holding unit, including three-jaw chuck attachment,

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Only \$132.00



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... EXPERIMENTAL DEVELOPMENT





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RAYMAC *Solid Carbide* DRILLS and REAMERS

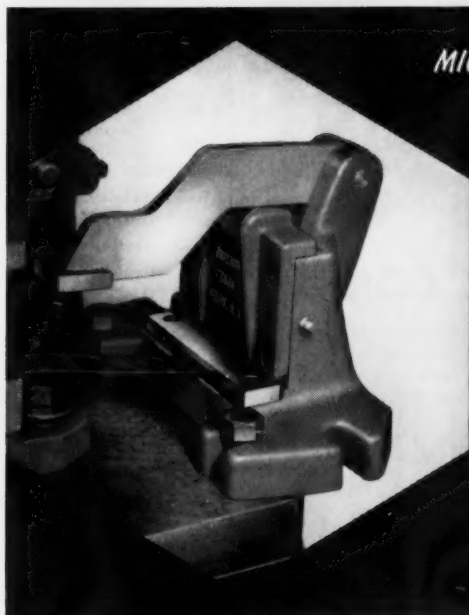
Raymac drills cut hardened metal ... do not burn or anneal. Feature operational speeds of 350 to 600 RPMs depending on size and hardness of metal.

Raymac solid carbide reamers are custom designed for individual jobs.

Write for catalog No. 12

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but TOPS AT \$69

A NEW **DURANT** SCRAP CHOPPER

A low cost scrap chopper operated by the press ram, independent of the die & without power. A tool steel blade gives a longer cutting life. These Durant units are easily bolted to press; handle any stock up to 3" wide & .062" thick, from any position. Whatever your needs may be there is a Durant chopper of proper size, capacity power and price.

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V-plate, L-plate and T-slot attachments. The Micro-Chuck is available in 8, 9 and 12-inch diameter sizes and can be used on drill presses, shapers, grinders, boring machines and milling machines, as well as on engine and turret lathes, for any number of operations, such as turning, boring, facing, chamfering, tapping and reaming. Eccentric drilling, boring or turning operations can also be performed.

Gage Checks End Diameters of Countersinks and Chamfers

Designated as the "Dialsink," a gage which is designed to check end diameters of countersinks and chamfers has been announced by Inspection Devices Co., Division of Corco Tool Co., 5636 S. Lake Park Ave., Chicago 37, Ill. The gage makes use of a dial indicator and, it is claimed, will read end diameters to an accuracy of 0.001 inch. Two

models are available, in four different ranges. According to the manufacturer, no adjustments need



"Dialsink" Counter-sink and Chamfer Gage

be made to check any end diameter within the range. One model is for checking any angle from 0 to 90 degrees, counter-sink maximum angle included. The other model is for any angle from 90 to 112 degrees, counter-sink maximum angle included. The gage is available in ranges of $\frac{1}{2}$, 1, 2 and 3 inches.

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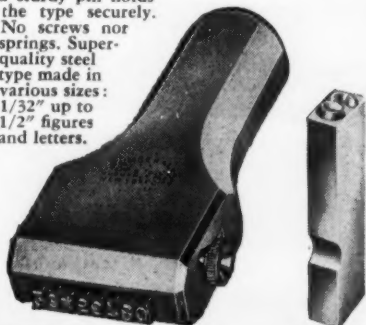
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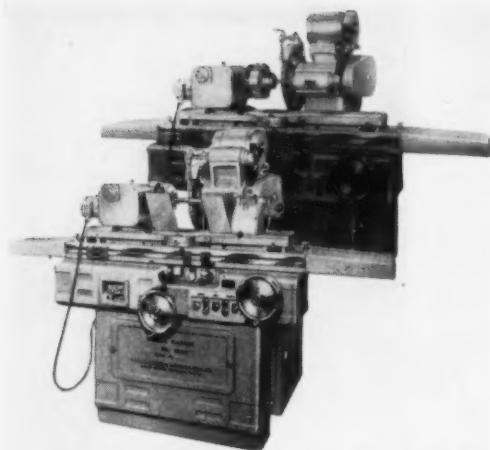
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Cylindrical and Internal Grinders

Machine Is Designed for Cylindrical and Internal Grinding

Primarily for plants having to do a wide variety of external and internal grinding, Gallmeyer & Livingston Co.,

408 Straight Ave., Grand Rapids, Mich., has developed the Grand Rapids No. 1230 Universal Cylindrical and Internal Grinder which is said to be capable of making rough cuts as well as producing the finest finish. The machine is of the cabinet base type, providing maximum stability of alignment, with the work carrying table mounted directly on fixed base ways without an intervening cross traveling saddle. This feature allows the operator to stand up close to the workpiece.

The table can be hydraulically operated at speeds from 3 in. to 50 ft. per minute with infinite variations

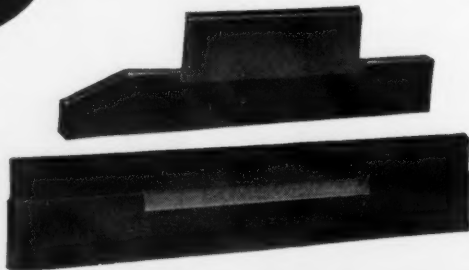


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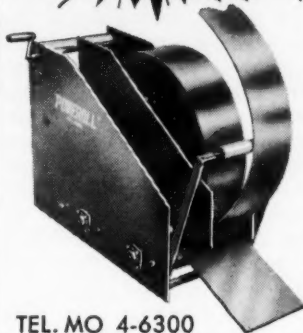
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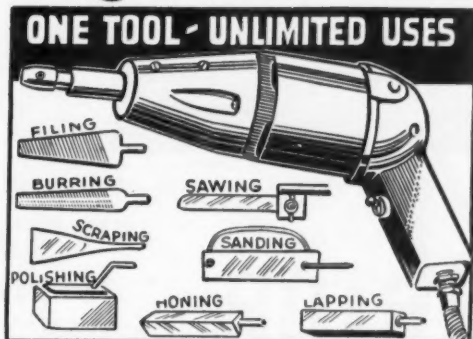
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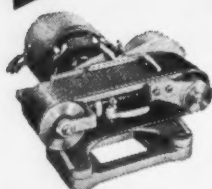
within that range. The hydraulic system is of the closed circuit, exhaust control type, embodying special features designed to provide smooth, uniform motion at slow speeds. All hydraulic controls are conveniently grouped directly above the electrical control panel. The table can be operated by means of a two-speed hand-wheel on the front of the machine. The machine table is mounted on a circular turn-table graduated in degrees, and

a taper per foot scale is mounted at the end of the table. The wheel feed handwheel is at the front of the base and includes micrometer cross feed mechanism for fine wheel feed.

The wheelhead is a heavy, rugged unit mounted on a large, graduated column on the cross sliding saddle. The machine is equipped with an extra heavy-duty, precision ball bearing, quill-type spindle, requiring no lubrication for the life of the bearings. The spindle drive motor is mounted directly on the grinding wheel head for motor and belt tension accessibility and speed changing. Two speeds are provided to allow the use of worn wheels. The wheel mount has built-in balancing weights. The internal spindle and drive is built into the wheelhead and is instantly available for use without a complicated setup. The internal spindle has a separate motor drive.



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The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and auto-

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Multiple Drilling and Tapping Machine Features Push- Button Control

Designated as the D225H, a high speed, push-button controlled multiple drilling and tapping machine designed for medium-sized work has been announced by National Automatic Tool Co., Inc., Richmond, Ind. The machine, with a unique feed and control mechanism, is said to eliminate unnecessary operator motions, making possible rapid operation and maxi-

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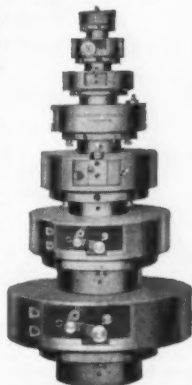
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One-way tool feed
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Automatic feed —
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feed reverse. Save
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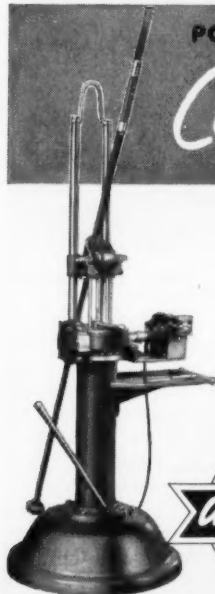
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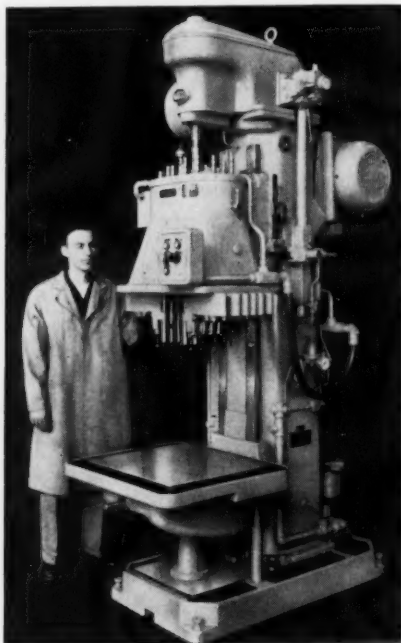


• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

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mum production. The machine is available with a single spindle head, an adjustable spindle head or a fixed center spindle head, giving it additional versatility and making possible the multiple drilling or tapping of small holes.

The standard cycle includes rapid traverse forward, first or coarse feed



Natco D225H Multiple Drilling and Tapping Machine

forward, second or fine feed forward, rapid traverse and stop. A jump feed cycle and time delay reverse cycle are both available as extra equipment. The jump feed cycle provides rapid traverse forward, first or coarse feed forward, rapid traverse forward, first or coarse feed forward, second or fine feed forward, rapid reverse and stop. The time delay reverse cycle includes rapid traverse forward, first or coarse

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DOUBLE LENGTH VERNIER



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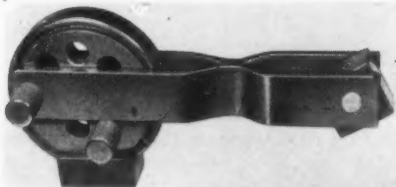
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(PATENTED)



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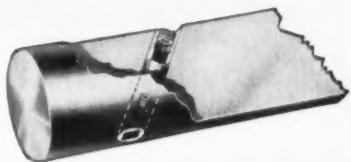
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One of the most difficult problems in tool making can be solved easily and quickly with **Sturdy Square Holed Sleeves**. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The **Sturdy Square Holed Sleeve** consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The **Sturdy Square Holed Sleeve** will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending



SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

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Literature*

feed forward, second or fine feed forward, dwell against positive stop for a predetermined time, rapid reverse and stop.

Air Operated Machine Bends Sleeves and Box Covers

Lexco Engineering & Mfg. Corp., P. O. Box 349, Colmar, Pa., has developed an air operated bending machine, of steel construction, which is design-



Lexco Air Operated Bending Machine in use

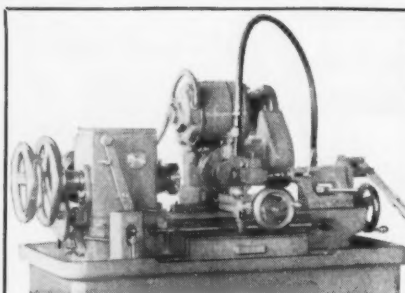


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SAVES TIME**

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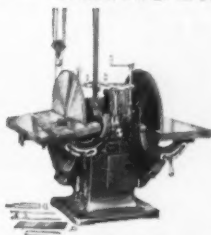
Plant: Beaver Falls, Pa.; Hammond, Ind.

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for fast
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Used in many metal working plants on production work. Has two 30-inch disks. Equipped with one plain table, and one slotted for circle, segment, duplicating gauges for grinding circular, angular, compound shapes. Self-contained hoist handles disks. Table tilts 45° up, 10° down.

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**TOOLS AND DIES FOR
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SAVAGE TYPE "S" Tools and Dies are made from a high carbon, high cobalt, special high speed steel. The life of the tool is increased many times, which means less sharpening, less down time and increased production. **PATENTED SAVAGE** Tool holder permits adjustment of tool for length, which makes possible repeated sharpening of tool.

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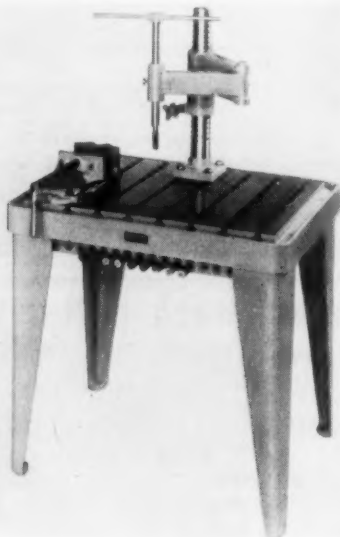
W. J. SAVAGE COMPANY
Knoxville Since 1885 Tennessee

PIONEER MFRS. OF NIBBLING MACHINES



Hand Tapping Fixture Has Large T-Slot Bed

Tools, Inc., 1733-37 N. 25th Ave., Melrose Park, Ill., has announced the Allman Universal Hand Tapping Fixture which is designed for use in tool-rooms, die shops and machine shops. The fixture consists of a 24 x 34-inch T-slot bed on bench-high cast floor legs and a heavy, jointed swinging arm which accommodates interchangeable tap holders and rotates on a rigid col-



Allman Universal Hand Tapping Fixture

umn mounted on the bed. Each tap holder has a centered female socket to receive standard taps in one end and slides vertically through a wide hub in the free end of the swinging arm. The top end of each tap holder is keyed to accommodate a T-handle for driving the tap. An assortment of tap holders, for various size taps, are held in a built-in rack below the table.

The swinging arm rotates around its supporting column and, being jointed, permits the tap to be instantly po-

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Special Gears and Conveyor Sprockets

Accurate Gear Works

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SACRAMENTO 2-5024

ACCURATE for service and dependability
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A Real Spring Winder!



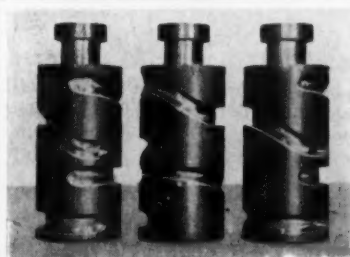
Will earn its cost in one day. The Horth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$1.50

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No. 3 Capacity 0 thru 5/16" wire \$5.00

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10 BEACON STREET WOBURN, MASS.



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For longer cam life, lower maintenance and higher load capacity . . . specify "Cams, hardened and ground" and ask Rowbottom to quote.

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Details on request.

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PASTE—Fast-cutting, Long-Lasting**

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includes Wheel, Tool, Cleaner. Complete Instructions.

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SHELDON M. BOOTH, Pres.

SOUTH HAVEN, MICH., U.S.A.

(LOC-KEY-SET DIAMOND RESET SERVICE)

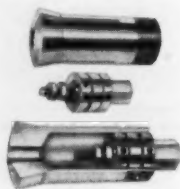


sitioned over any point on the bed. The arm can also be raised or lowered on the column, by a hand clamp nut, to any desired head clearance above the workpiece. The column is also movable on the bed and is rigidly held by four T-slot bolts in its base. Set-up and hold-down tools available as accessory items include movable machine vise, T-slot bolts and clamps. The vise has stepped back jaws for accommodating small, as well as large, workpieces.

Collet Stop Is Instantly Adjustable

Wohnip Products, Inc., 390 Hillside Ave., Hillside, N. J., has announced an instantly-adjustable collet stop which is designed to limit the entrance of the workpiece on second operations to be turned, formed, faced, drilled, bored, tapped, and so on, in lathes, turners, automatics, hand screw machines, millers and other machines. According to the manufacturer, the stop eliminates the measuring of each

workpiece on a production job, assuring consistent accuracy and avoiding the possibilities of spoil-



Wohlrip Instantly-Adjustable Collet Stop

age and scrap.

The stop is interchangeable among collets of a like style, and no alterations are said to be necessary to standard collets. Three-point gripping cam surfaces, it is claimed, provide maximum holding power without collet distortion, and in no case will the collet stop go beyond the slots in the collets.

**BEST
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TOOL**

LIGHT AS YOU WANT IT
for Machine Tools, Assembly
and Inspection Benches

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MODEL 2-MH-700
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\$7.04 in std.
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Reflector—5" long x 3 3/4" wide x 3" deep. Rotates 360°. Accommodates 100 watt A-21 or 60 watt A-19 lamp.

Arm Joints—New patented tension disc design. Easy, smooth action with only one hand. Available with 1, 2 or 3 arms.

Base—Universal for vertical or horizontal mounting. Also adaptable to outlet boxes. Collet revolves 360°.

Wiring—McGill industrial socket 4101-FL with Levolver switch. 8 ft. POT-32 18-2 heavily insulated oil resistant wiring with molded plug.

Finish—Gray baked enamel. Reflector interior, high temperature White.

Directs
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Exactly
as Needed

WRITE for complete catalog of Localite models for every industrial use.

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built-in Huppert temperature controller. All-steel construction—multi-insulation—sturdy Kanthal elements—counterweighted doors—removable porcelain tray.

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Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
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439DL	4 1/4"	3 3/4"	9"	300°-1600° F.	1700	115.00
436DL	4 3/4"	3 3/4"	6"	300°-1900° F.	1700	115.00
5DL	4 3/4"	3 3/4"	9"	300°-1900° F.	1700	172.00
9DL	6"	6"	6"	300°-1900° F.	2200	200.00
669DL	6"	6"	9"	300°-1900° F.	3000	248.00
10DL	8"	4"	6"	300°-1900° F.	2200	215.00
849DL	8"	4"	9"	300°-1900° F.	3000	265.00

Available for 220 Volt AC at small additional cost.
Stainless steel housing slightly higher.

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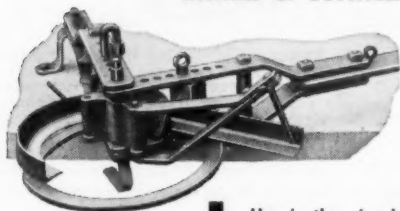
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one bender**

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**UNIVERSAL®
IRON BENDER**

**with HYDRAULIC
ATTACHMENT**

**BEND Angle Iron
INWARD or OUTWARD**



**Bends Flat,
Round, Bar,
Angle
and Pipe**



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WALL CONDUIT**

Here's the simple solution to two of your most difficult bending problems . . . angle iron and conduit. These special attachments for your HOSSFELD Iron Bender bend these special materials neatly, quickly, accurately to your exact specifications . . . a smooth, easy, one-man operation. Ask about the HOSSFELD Hydraulic Attachment that gives you complete mechanical operation.

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TAPERED SHANK KEYSEAT CUTTERS

**THE
BEST COSTS
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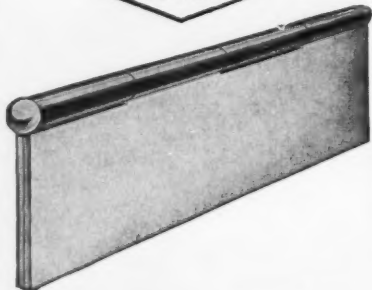
1. Tapered drive assures concentric operation.
2. Special Surface Treatment for longer life.
3. Premium Grade H.S.S.
4. Large Centers for outboard support.
5. **COSTS NO MORE THAN REGULAR WOODRUFF CUTTERS.**

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Manufactured by

**AUTO MOULDING
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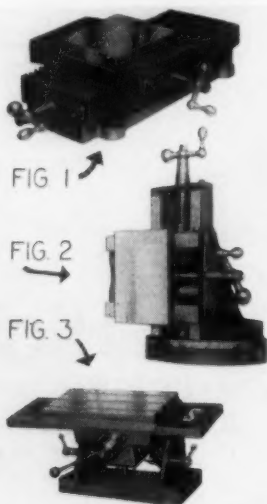
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1114 E. 87TH ST.

CHICAGO 19

Redesigned Slides, Feeds and Tables

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, has announced that its complete line of slides, feeds and tables has been redesigned to offer the maximum in accuracy. The compact, rugged design of the machine tool attachments accommodates weights ranging from 5 to 2,500 lb., available with single traverse and/or compound traverse. Each tra-



(Fig. 1) Standard Compound Feed with neoprene accordion slide protector. (Fig. 2) Standard Compound Feed with integral angle mounting base and graduated swivel mounting base. (Fig. 3) Standard 8 x 21-Inch Precision Table

verse has a crank handle with a 10-pitch feed screw. One revolution of the crank handle equals 0.100 inch travel.

The assembly base and/or the mounting pad are available with swivel up to 360 degrees. The dovetail slide units have a length of traverse, on the smallest size, of 5 inches, with the maximum stock-size traverse of 12 inches. Greater length of traverse can

JIG BORING

and

Large Precision Machining

Done to your specifications

We Have 13 Jig Borers

KIDDE PRECISION TOOL CORP.

37 FARRAND ST.

BLOOMFIELD, N. J.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.



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MARK and DEMAGNETIZE IN ONE OPERATION

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Luma
TOLEDO, OHIO
WAY



The Luma combination etchtool and demagnetizer, etches, demagnetizes, anneals and solders. Permanently marks hardest steel with ease of a pencil. Write for complete information.

Luma Electric Equipment Co.

P. O. BOX 132-MS

TOLEDO 1, OHIO

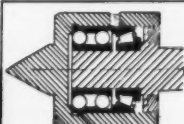
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**SPEED UNIT PRODUCTION
RUGGED • FRICTIONLESS • ACCURATE**

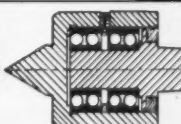
QUADRO LIVE CENTERS will take heaviest loads at highest speeds for the longest time. That's why they are specified 8 out of 10 times by factory management. On lathes, millers — any machine tool — you can count on QUADRO CENTERS for closer tolerances, fewer rejects, greatly increased production. Guaranteed!

See your Supply Dealer, or
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NEW HYDE PARK, L. I., N. Y.



TIMKEN BEARING
LIVE CENTER



BALL BEARING
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"TWO DECADES OF IMPORTANT TOOL PARTS PRODUCTION"

be furnished on request. Smaller sizes have a straight gib on the dovetail slide, while the larger sizes are furnished with a taper gib for proper tensioning or to compensate for wear.

Both Figs. 1 and 2 in the accompanying illustration show compound feeds. Figure 2 also illustrates the availability of integral angle mounting base and identifies the graduated swivel mounting base. Optional equipment on the feeds include neoprene accordion slide protectors (Fig. 1) and

micrometer dial. These slides are available in "endless-versatile-variations" of combinations, either single or compound traverse for flat, vertical or inverted mounting. They are also available with anti-friction traverse.

Figure 3 in the accompanying illustration shows the 8 x 21 inch precision table with anti-friction bearings, dovetail slide and taper gib. The ways and bearings are fully protected, with the unit having been designed for use with a face or surface grinder assembly involving

copious coolant supply. The table shown herewith was designed for graduated tilting from 3 degrees above to 30 degrees below the horizontal plane. However, the table is also available for fixed horizontal plane. Although illustrated with pinion-drive handle having ratchet-like adjustment, the table is also available with hydraulic traverse. Table travel is 3 inches either side of center, or a total of 6 inches. Each reciprocation of the table actuates a built-in pump for automatic lubrication to all vital parts. The table body has a large oil reservoir with a built-in oiler, oil level and drain.

New!
Incomparable!

dyna-trol **ELECTRIC FURNACES**



COMPARE THESE FEATURES

- Infinite Zone Control to 2000° and 2300°F
- Zone temperature indication by Pyrometer Selector Switch
- Porcelain Element Holders
- Automatic Hold and Cut-off instrument available
- Infinite Variety of Time-Temperature Curves Obtainable
- Rugged Construction. Highest quality insulation used.

COMPARE THESE PRICES

Firing chamber (H. W. D.)	Semi-Auto. prices	Auto. prices
6"x12"x12"	\$295.	\$432.
12"x12"x12"	\$405.	\$550.
9"x 9"x18"	\$480.	\$625.
14"x14"x14"	\$525.	\$680.
20"x20"x20"	\$975.	\$1140.
18"x18"x36"	\$1125.	\$1375.
(To 2000° Maximum Temp.)		

Over 40 Standard Models — Write for complete literature

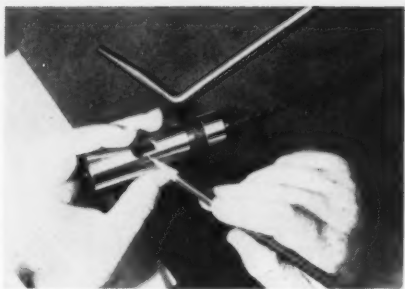
L & L

**INDUSTRIAL DIVISION
MANUFACTURING CO.
CHESTER 71, PA.**

"Keyhole" Drift Slot Provides Trouble-Free Tool Ejection

A "Keyhole" style of drift slot which is said to provide a trouble-free tool ejection method for spindle-type machine tools has been announced by Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill. Specifications for the drift slot and a line of standard "Keyhole" Tool Ejectors are being offered designers of machine tools wishing to adapt the method. An advantage claimed for the "Keyhole" design is that it eliminates damage to machine bearings and spindles often caused by hammering.

Slot design consists of a round top portion, which serves as a bushing for the "key," and a rectangular slot to permit use of conventional drifts should a tool or adapter become jammed in the spindle. The cam-shaped tip of the ejector rotates against the top of the tang, pushing the tool from the spindle in one easy and fast mo-



Scully-Jones "Keyhole" Drift Slot and Ejector

tion. With very little leverage, the operator, it is claimed, can exert a smooth, powerful force behind the tang.

There are said to be no axial stresses or shocking hammer blows to destroy spindle alignment or damage precision bearings. Ejectors are available in five standard sizes for Nos. 1, 2, 3, 4 and 5 Morse taper spindles.

SAVE COSTLY SET-UP TIME!

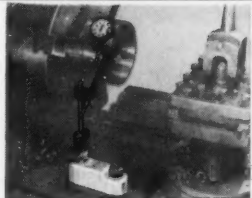
Instant Pin-Point Positioning
with these NEW MAGNETIC BASE
DIAL INDICATOR HOLDERS

"TINY-TITAN NO. 130"

Magnetic Base
Indicator Holder
with Precision
Adjustment

- ✓ New, 3-Step Universal Rod in 7/32, 1/4 and 5/16" diameters, for all indicators.
- ✓ Mounts to flat or down to 3/4" round surface with 65 lb. pull.
- ✓ Adapter permits full 360° adjustment in all directions.
- ✓ Many other new features.

PRICE: \$9.50,
Attractively Boxed.



Model 160 being used to indicate workpiece on Engine Lathe

"TINY-TITAN NO. 160"

Heavy Duty, Duplex Magnetic
Base Indicator
Holder with Pre-
cision Adjustment

- ✓ Magnetic pull, 125 lbs.
- ✓ Fool proof adaptor.
- ✓ Case non-breakable tenite, 1 1/4" x 4" x 1 1/4" high.
- ✓ Jack type magnet release.
- ✓ 3-Step Universal Rod.

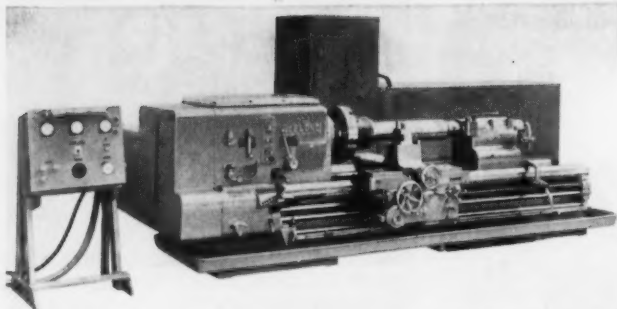
PRICE:
\$17.75,
Attractively
Boxed.



Send for Bulletin No. 605, covering other Tiny-Titan tools.

ENCO MANUFACTURING COMPANY, Dept. 115
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Sold all over the U.S. and Canada
through Enco franchise dealers.



**LeBlond 32-Inch
Heavy-Duty Engine
Lathe**

Heavy-Duty Engine Lathe Is Equipped with 125-H.P. Motor

The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, has announced the development of a 32-in. heavy-duty engine lathe equipped with a 125-h.p. motor which is said to provide 118 h.p. at the cut. The machine features infinitely variable speeds from 42 to 1,400 r.p.m. and 56 feeds from 0.002 to 0.250 i.p.r. The lathe utilizes four directional power rapid traverse built into the apron, one-piece apron and hardened rack, totally-enclosed quick-change box, hardened and ground steel bed ways and thrust-lock tailstock.

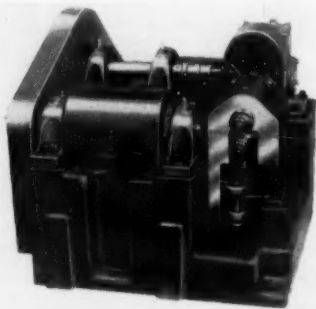
According to the manufacturer, the lathe, or variations of it, will find application in many industries where high-power turning is advantageous, including railway equipment, commercial boat building, diesel engines, hydro-electric equipment and steel mill rolls.

Bench Model Wire Straightener Is Self-Feeding

For small shop requirements of straightening fine wire, Mettler Ma-

chine Tool, Inc., 132 W. Lawrence St., New Haven, Conn., has announced a bench model "Shuster" Wire Straightener which is self-feeding. According to the manufacturer, the rotary machine is unusually sturdy and compact, measuring only 16 inches from its longest dimension. A choice of arbors mounted in ball bearings, each with five straightening dies, is available, one which is designed for wire in the 0.020 to 0.040-inch range and the other for wire in the 0.025 to 0.062-inch range.

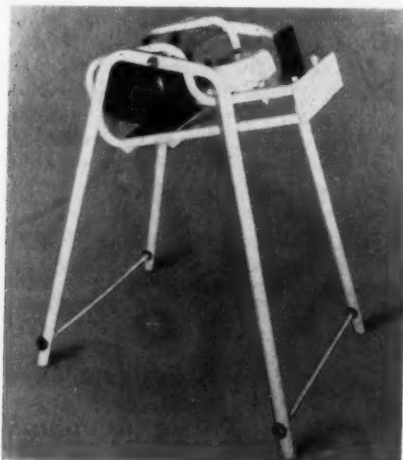
The machine is supplied fully equipped with 1/2-h.p. high-speed motor and mounting lugs for bench installation. The unit can be furnished geared to feed 30, 60 or 90 feet per minute, as desired. One set of cast iron dies is included, along with stub screws, wrench, necessary guards and gear reducer. Other dies can be supplied for use in straightening various types of metal.



**"Shuster" Automatic-Feed Bench-Model
Wire Straightener**

Scrap Chopper Eliminates Jamming of Feed System Through Press

Northeastern Development Engineers, Inc., 21 High St., Dept. 21, Pawtucket, R. I., has announced the Birtwell Scrap Chopper which is designed to eliminate any possibility of jamming the feed system for roll stock on punch presses. The complete unit is suspended to "float" freely from its base. With waste stock passing



Birtwell Scrap Chopper

through the cutting slot, the unit rocks down with the jump of the stock, cuts, and then rocks back up to "grab" another chunk. Thus, all back pressure is said to be eliminated, stock is not bowed and feed systems through the press will not jam.

The scrap chopper weighs only 50 lb. and is portable, allowing it to be moved from press to press as needed and placed in just the right position to best receive the waste. The chopper utilizes interchangeable heavy-duty cutters and has a capacity of handling stock ranging up to 3 inches wide x 0.050 inch thick.

January, 1955

Only

THRIFTMASTER Universal Joint Type DRILL HEADS

have these exclusive* features

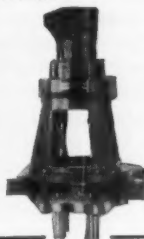
*Standard Full Ball Bearing Construction, including Spindles

Driving assembly is Full Ball Bearing mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.



*Standard Slip-On and Slip-Off Template Construction

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.



6 Standard Models . . .

Models U-608 and U-1000—Ball Bearing
Models U-620B and U-1012B—Plain Bearing,
1 1/16" or 1/2" min. centers
Models U-608-B5 and U-1000-B5—Ball Bearing Gear Case, Plain Spindles

Semi-Standard Heavy Duty Full Ball Bearing . . .

1/2" in Cast Iron—1-7/16" min. centers
7-1/8" or 9-3/4" Dia.
1/2" in Steel—1-13/16" min. centers
7" or 9-5/8" Dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

WRITE FOR FULL INFORMATION

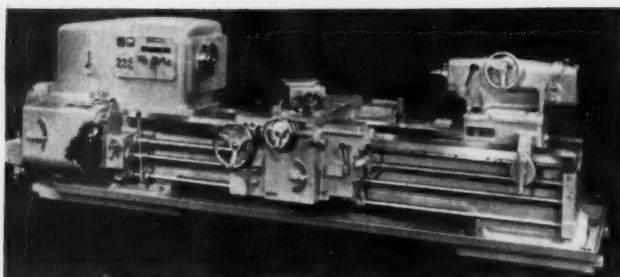
Subsidiary of
Thomson Industries, Inc.

THRIFTMASTER Products Corporation

1034 N. PLUM STREET
LANCASTER, PA.

Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS

MODERN MACHINE SHOP 279



Monarch Series 90
"Dyna-Shift" Lathe

Lathe Utilizes Carbide Tooling to Advantage on Large Work

To permit carbide tooling to be used to the fullest advantage on work of considerable size, The Monarch Machine Tool Co., Sidney, Ohio, has developed the Series 90 "Dyna-Shift" Lathe which is available in three models, each with a main drive motor capacity equivalent to 60 horsepower. The Model 2500 swings 25 in. over the cross slide and has a clearance diameter of 40 in., while the Model 2501 swings 31½ in. over the cross slide and has a clearance diameter of 44 inches. The Model 2502 swings 36½ in. over the cross slide and has a clearance diameter of 48 inches.

According to the manufacturer, the outstanding feature of the machine is the Dyna-Shift headstock which makes it easy for the operator to pick the right surface cutting speed for a given diameter and which sets the combination up automatically so that by no possible human error can it be changed. With the Dyna-Shift, all that an operator has to do is set two dials, one for the surface cutting speed desired, the other for the diameter to be turned. Instantly and automatically, the headstock gears of the lathe are shifted hydraulically to give the correct spindle speed at which to operate. Subsequent changes in turning speed on progressive diameters of the workpiece are made in the same manner and just as quickly and easily. The

entire procedure requires under three seconds.

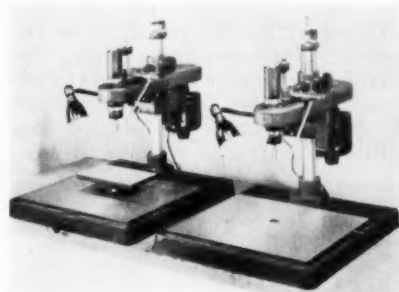
The Dyna-Shift control lever has three positions; namely, "free,"

"run" and "shift." When the lever is thrown to "shift" position, spindle rotation stops immediately. With the control lever in "free" position, the massive spindle may be rotated easily by the slightest pressure of the hand. Work start and stop is controlled by dual levers, one at the headstock and the other at the right side of the apron. The forward position of the lever is "run," the straight up-and-down position is "brake" and pushed back toward the machine is "jog." The lathe is provided with 36 spindle speeds, operating in a range from 6 to 750 r.p.m. for a speed change ratio of 1 to 125. The hole through the spindle is 4⅞ in. in diameter, and the spindle is provided with an 11-in. American Standard D-1 Camlock nose. Lubrication of all headstock gears and bearings is through a high pressure mist system, providing just the proper amount of oil to the anti-friction bearings and further discharging a light spray where a larger quantity is needed for gear lubrication.

Super-Sensitive Drilling Machine Has Extra Large Base

Identified as the "Maximus," a large base, super-sensitive, toolroom drilling machine which is designed to drill small holes, from 0.004 to ⅝ inch, in all drillable materials has been announced by The Hamilton Tool Co., 828 S. Ninth St., Hamilton, Ohio. An

extra large, accurately machined base pad, measuring 21 x 17 inches, is said to afford ample working space for dies,



Hamilton "Maximus" Super-Sensitive Toolroom Drilling Machine

jigs, fixtures and other toolroom parts. Auxiliary demountable work tables for small work may be supplied as extra equipment.

According to the manufacturer, the machine is capable of drilling to the center of a 16-inch workpiece. Four spindle speeds are obtained through one drive. A choice may be made from four drives which provide spindle speeds from 750 to 8,750 r.p.m. The self-contained drilling unit swings radially on the column and can be locked in any position. All moving parts of the unit are completely guarded. The machine is powered by means of a $\frac{1}{4}$ -h.p. motor.

Press Features Double-Action, Right-to-Left Drive

Clean, uncluttered design and compactness are said to be made possible by an unusual one-point, double action, right-to-left drive used in a new series of presses manufactured by Danly Machine Specialties, Inc., 2100

CUT . . . operating — maintenance — spoilage **COSTS!**

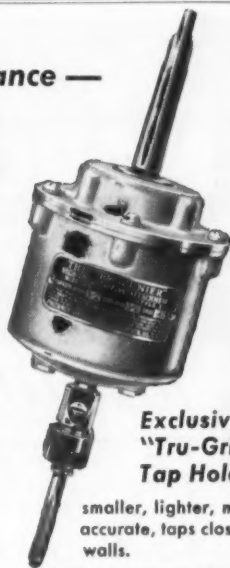
ON YOUR TAPPING JOBS!

Procnier tappers are the solution to steadily rising production costs on many tapping operations. They have the unique construction features that permit inexperienced operators to tap like experts. In addition, they provide many extra hours of continuous, accurate tapping without frequent "down-time" interruptions, producing more pieces with fewer rejections, less spoilage and a minimum of broken taps.

Check these advantages: New sensitive double cone friction clutch; soft cushioned action driving pressure; ball bearing equipped; heat treated gears; special balanced gear reversing mechanism, plus many others.

Write for free brochure giving full details on the complete line of Procnier Tapping Heads.

PROCUNIER Safety Chuck Co.,



Exclusive "Tru-Grip" Tap Holder

smaller, lighter, more accurate, taps close to walls.

12 South Clinton Street,
Dept. 1, Chicago 6, Ill.

RUST-LICK IN AQUEOUS SYSTEMS

RUST-LICK "B"

For use wherever water comes
in contact with Ferrous Metal.

STOPS RUST IN

Hydrostatic-Pressure Testing
Cleaning and Washing
Heat-Treating
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Additive to Soluble Oils

ELIMINATES:

Fire Hazards • Toxicity
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PRODUCTION SPECIALTIES, INC.

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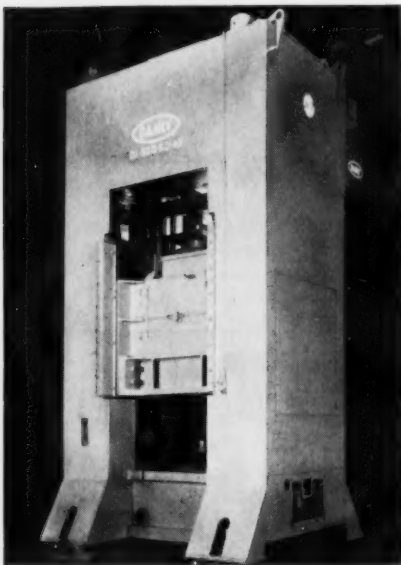
Join the MARCH OF DIMES

in

January



S. Laramie Ave., Chicago 50, Ill. The press has a 26-in. stroke and 60-in. shut height on the inner slide, yet the overall height of the press is only 21 feet. Extreme compactness has been achieved by placing the drive on the back of the crown and bringing the blankholder linkage down into the up-rights. According to the manufacturer, special shallow bed construction, without sacrifice of rigidity, reduces



Danly Double-Action Right-to-Left Drive Press

the height and eliminates the need for an installation pit.

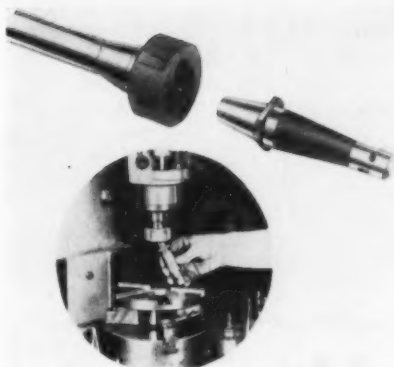
Adjustments for the blankholder have likewise been kept inside the body of the press to maintain a clean line. Linkage bearing surfaces and blankholder gibs are constantly flushed with filtered oil from an automatic circulating lubrication system. The press is equipped with an eddy current clutch, providing electrical acceleration of the slide motion for faster stroking rates.

Quick-Change Tools Are Designed for Small Mill Operations

For small mill operations, Portage Double-Quick Tool Co., 1041 Sweitzer Ave., Akron 11, Ohio, has introduced a line of quick-change tools, designated as the V.S. (very small) Series, which require only $\frac{1}{2}$ -inch tool clearance between the end of the tool and the workpiece in order to change tools. According to the manufacturer, the tools practically eliminate the lowering or shifting of the table and work when changing from one tool to another.

The tools are available in sets which include a toolholder, boring bar adapters, drill sleeve adapters, end mill adapters, shell and face mill adapters and a Jacobs chuck adapter. The actual number of tools in each of two different sets depends on the application and use.

The tools and adapters are available



Portage V.S. Series Quick-Change Tools for small mill operations

with No. 30 milling machine tapered shanks, Nos. 2 and 3 Morse taper, Nos. 7 and 9 B&S shanks and R-8 shanks. Special type shank holders can be supplied on request.



MONEY-BACK TRIAL OFFER

Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. \$3.25 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.30 per gallon, f.o.b. Dayton.

PROTECT-O-METAL

G. W. SMITH & SONS, INC.

5407 KEMP ROAD, DAYTON, OHIO

Improved Optical Comparator Has Large Range Micrometer Stage

George Scherr Optical Tools, Inc., 200-MM Lafayette St., New York 17, N. Y., has announced the improved Wilder Micro-Projector which incorporates a larger range micrometer stage with 2 in. longitudinal movement and 1½ in. cross movement. The instrument is equipped with heavy-duty micrometer drums graduated directly

in 0.0001 in. without vernier. One inch adjustment in each direction is by means of the micrometers, the balance being obtained by gage blocks.



Improved Wilder Micro-Projector

How flat

should YOUR

SURFACE PLATES

be?

This informative, **FREE BOOKLET** will help you to:

1. Determine your particular needs.
2. Buy no more accuracy than you require.
3. Get the full amount of accuracy you specify and pay for.

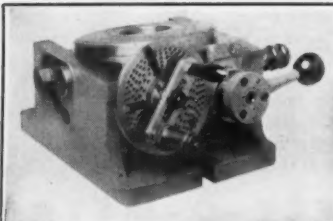


SEND FOR YOUR FREE COPY NOW!

RAHN GRANITE SURFACE PLATE CO.

636 North Western Ave., Dayton 7, Ohio

The improved projector incorporates all the features of the other models, namely the vertical light beam with flat work stage, permitting most parts to be placed flat on the stage without the necessity of holding fixtures. Seven different magnifications from 10 to 100X are available, and protractor charts for angular measurements reading to five minutes of arc and a surface illuminator for inspecting parts such as stamps, medals, coins, watch plate dials, and so on, can be supplied.



Sole Agents

Model SHU

KARL A. NEISE

Dept. MMS, 404 4th Ave., N. Y. 16, N. Y.

A NEW TYPE WALTER PRECISION DIVIDING HEAD

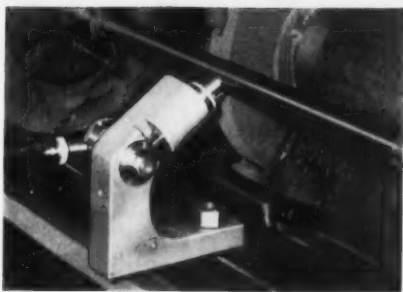
- Operates Horizontally, Vertically
- Easy Handling
- For Quick, Plain, and Degree Indexing
- Versatility Increased by Various Accessories
- High, Long-lasting Precision

Each tool supplied with individual test report.

Max. permiss. error chart supplied with literature.

Steadyrest Supports Work in O.D. Grinding Operations

Last Word Sales Co., 18500 Mt. Elliott, Dept. B, Detroit 34, Mich., has announced the Gray-Grimes Steadyrest which is designed specifically to be used as a work support in outside diameter grinding operations. According to the manufacturer, the unit maintains equal support of the workpiece regardless of length while permitting the grinding wheel to pass back and forth without stopping. The steadyrest is also said to automatically compensate for stock that is ground off the workpiece, without making it necessary to true up a spot for the shoe of the unit. Designed to give stabilizing support from the rear and underneath the workpiece, the unit maintains constant pressure against the workpiece, the pressure being exerted by a V-shaped shoe which is con-



Gray-Grimes Steadyrest in use

trolled by a cam, actuated by a counterweight.

The Gray-Grimes Steadyrest is available in three models for universal grinders having from 5 to 6-in. center heights, for universal grinders having from 6 to 7½-in. center heights and for No. 13 B&S grinders.

ENGINEERED

Live Centers

Standard shanks with Morse tapers carried in stock . . . send us your specifications and blueprints . . . we will see that your job is set up with the right LIVE CENTER.

STURDIMATIC

TOOL COMPANY
3904 F STREET • DETROIT 16, MICH.

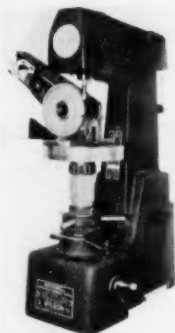
Fixture Allows Hardness Testing on Pitch Line of Gear Teeth

A holding fixture, by which gears may be quickly and accurately tested for hardness on the pitch line of gear teeth, has been announced by Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc., 230-G Park Ave., New York 17, N. Y. Designed for use on a Rockwell Superficial Hardness Tester with a special gooseneck type Brale, the quick-change device will accommodate gears

of various sizes in either a laboratory or production operation. The test cycle, it is claimed, can be completed in seconds.

The gear to be tested is placed on an inclined plane mounted on a sliding plate, and the plate is then moved toward a positioning anvil which is designed to compensate for the diametrical pitch. An elevating screw is raised to bring the Brale into contact with the gear tooth. A lock screw on the base plate, used to lock the inclined

plane in position, is then tightened. A locking clamp is located on the elevating screw. This locking



Wilson Rockwell Hardness Tester equipped with gear testing fixture

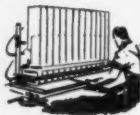
clamp is a safety device, which is said to prevent possible injury to the Brale should the elevating screw be lowered too far. A constant center line is maintained by a pivot screw which prevents the fixture from

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Pathfinder in AIR POWER AUTOMATION

moving past this center line. A cam-type adjusting clamp then slides down. The gear is locked tightly in position by the cam, the Brale is brought into actual contact with the gear, and the Rockwell hardness test cycle is performed.

Anti-Scaling Powder for Use at Temperatures up to 1,650 Deg. F.

Identified as "Keepbryte," an anti-scaling powder which is designed for use at all temperatures up to 1,650 deg. F. has been announced by Kase-nit Co., 799 Greenwich St., New York 14, N. Y. According to the manufacturer, the compound is particularly recommended for steels where non-scaling atmospheres in furnaces are not available. To use, the component may be heated to 450 deg. F. or so and the compound sprinkled on, or the component can be dipped in the powder, or the powder can be dissolved and suspended in methylated spirits and painted on the component before treatment.

At quite a low temperature, the powder, it is claimed, runs into a liquid film of a highly protective nature, and yet not thick enough to affect detrimentally the efficiency of a subsequent quench. The anti-scaling compound is not recommended for temperatures above 1,650 deg. F. because it then becomes very difficult to remove after quenching. However, at temperatures below this point, the operation is said to offer no serious difficulties.

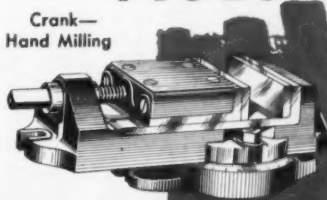
Drilling Machine Features Large Table

Designated as the Model E-25, a drilling machine which utilizes a large 22 x 30-in. table for accommodating extra-large, bulky and heavy work has been introduced by Sibley Machine &

SKINNER

precision machine VISES

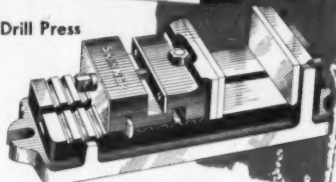
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Cam—Dual Action



Drill Press



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CHUCK COMPANY

210 Edgewood Avenue, New Britain, Conn.

Foundry Corp., Dept. MMS, South Bend 23, Ind. The machine has a pedestal jack, ruggedly constructed, to support the table and to permit lowering and raising the table to accommodate jobs of more than average height. Other features which are said to adapt the machine to heavy work are a drilling capacity of 1 in. in cast iron and $\frac{3}{4}$ in. in steel; a large swing of 25 in.; a coolant trough in the table; a full floating ball bearing spindle with a maximum travel of 8 in.;

a $4\frac{1}{2}$ -in. diameter solid column; a table accuracy maintained to 0.0007 in. in a 6 in. radius; and a variable drive from which the exact spindle speed may be obtained from any size drill from $\frac{1}{8}$ to 1 inch.

According to the manufacturer, the wide range of spindle speeds available are quickly and easily obtained by a self-locking control which is convenient to the operator. There are no belts to change. A tachometer on the front of the machine provides accurate read-

ing of speeds. Five options of spindle speeds, each with a 4 to 1 ratio, are available, ranging



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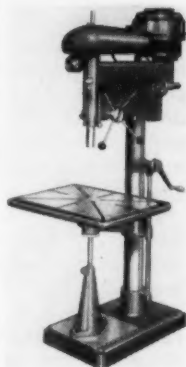
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Sibley Model E-25 Drilling Machine

from a low of from 206 to 825 r.p.m. to a high of from 540 to 2160 r.p.m., with a three-phase 60-cycle motor. A speed chart on the side of the machine shows proper speeds for different drill sizes.

Cabinet-Type Lathe Has 24 Inches Between Centers

Delta Power Tool Division, Rockwell Mfg. Co., 438 N. Lexington Ave., Pittsburgh 8, Pa., has introduced an 11-in. cabinet model variable speed drive lathe which has a 24-in. capacity between centers and a 1-in. collet capacity.

The diameter of the hole through the spindle is $1\frac{3}{8}$ inches. An outstanding feature of the machine is a back gear shift lever, located on the front



Delta 11-Inch Cabinet Model Variable Speed Drive Lathe

of the tool within easy reach of the operator at all times, that eliminates any need for using wrenches, pulling out pins or opening guards to shift from direct spindle drive to back gear spindle drive, loose or locked spindle. Another unique feature of the machine is a vari-speed drive which provides a speed range of from 44 to 1,550 r.p.m. with an infinite choice within that range. According to the manufacturer, speeds can be changed without turning off the machine.

The lathe is offered with a choice between a $2\frac{1}{4}$ -8 threaded spindle nose and a LOO long taper spindle nose.

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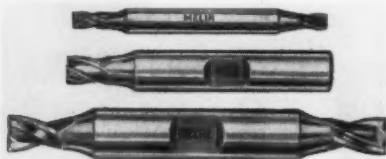
MODERN MACHINE SHOP

The spindle is carried on two tapered roller bearings on the inboard end and a floating sealed ball bearing on the outboard end. This spindle construction, it is claimed, ensures accuracy of cut under all loads and speeds by allowing the spindle to slide on a ball bearing to compensate for any tendency to expand when running hot.

Other features of the machine include a precision ground bed provided with separate vee and flat ways for carriage and tailstock; a lead screw shear pin supplied as standard equipment; quick-change non-jamming feed controls which are easily accessible to the operator without interference with the carriage or feed change levers; total of 48 thread and feed changes with a thread range of from 4 to 224 and a feed rate range per revolution from 0.0902 to 0.0016 in. longitudinal and 0.0301 to 0.0005 in. cross; and large, easy-to-read dials.

Stub Length End Mill Has Three Flutes

Melin Tool Co., Inc., 3373 W. 140th St., Cleveland 11, Ohio, has announced the addition of a stub-length three-



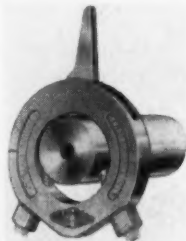
Melin Stub-Length Three-Flute End Mills

flute end mill, with flutes shorter than standard, to its line of tools. The mill is available in single and double end styles on $\frac{1}{8}$ and $\frac{3}{16}$ -inch diameter shanks. The three flute mill is in addition to the regular two and four flute types and is made of high speed steel, hollow ground with fast spiral flutes.

Grinder Dog Features Brass Cam and Screws to Protect Workpiece Surface

To protect the surface of workpieces, Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., has announced that the

"Red-E" Cam-Action Grinder Dog is now supplied with brass cam and screws, as well as hardened steel cam and screws. The grinder dog is said to be easy to adjust and has an instant, positive action. A concealed spring



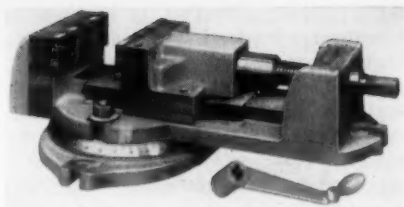
"Red-E" Cam-Action Grinder Dog with brass cam and screws

holds the cam to the work. According to the manufacturer, the cam-action dog saves time and labor especially on semi-automatics or where there is little traverse feed, for all that is required is to place the work in the dog, holding the cam against the spring tension with a finger, and set the two screws. Release the cam and the work is held securely by the spring action. To remove the piece, it is claimed to be necessary only to release the cam.

The grinder dog is available in sizes to accommodate diameters from $\frac{1}{8}$ to 4 inches. Steel cam and screws are supplied with the grinder dog unless brass is specified.

Heavy-Duty Vise Has Large Opening Capacity and 6-Inch Wide Jaws

A heavy-duty vise which is designed for use on milling machines and other machine tools has been introduced by Wilton Tool Mfg. Co., Inc., 925-941 Wrightwood Ave., Chicago 14, Ill. The vise features a large maximum opening capacity of 6 $\frac{1}{4}$ inches and has 6-



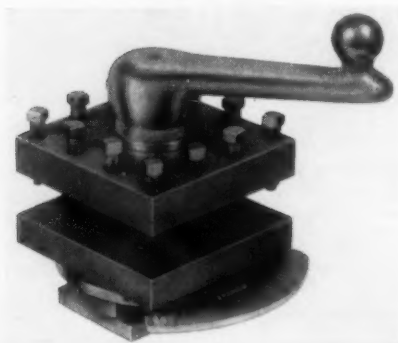
Wilton Heavy-Duty Vise

inch wide jaws. According to the manufacturer, the heavy-duty vise weighs 133 lb. and is available in two styles, one with a graduated swivel base and the other with a stationary flanged base.

Turret Toolholder Indexes 120 Positions

O. K. Rubber, Inc., Manufacturing Division, Littleton, Colo., has announced the Elby French Turret Toolholder which is said to provide super accurate indexing, with 120 possible positions. The turret, it is claimed, has 12-position detent selection. Holding four tools, the unit is said to be ideal for adaptation for carbide tools. According to the manufacturer, the turret toolholder can be supplied adapted to fit individual lathes.

Elby French Turret Toolholder



January, 1955

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Improved Portable Electric Drills Feature Greater Power

Skil Corp., Dept. MMS-114, 5033 Elston Ave., Chicago 30, Ill., has announced two portable electric drills, designated as the Models 75 and 78, which have 55 per cent more power than former models. Despite the increased power, the drills are said to be lighter in weight. Features which are claimed to make the drills easy to maintain include large inspection plate

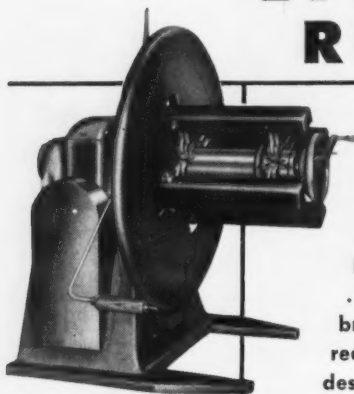
which is easily removed for brush and commutator inspection and cleaning of commutator and motor housing; internal cord clamp with molded rubber strain relief which prevents fraying and breaking; switch handle which is easily accessible for inspection; and improved fan and baffle plate for cool operation.

The Model 75 is a 1/4-in. compact heavy-duty drill recommended for all types of constant heavy-duty work.

Standard speeds of 1,800, 2,500, 3,500 or 5,000 r.p.m. can be furnished, the higher speeds being best

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(Top) Skil Model 75 1/4-Inch Heavy-Duty Portable Electric Drill.
(Bottom) Skil Model 78 Standard Duty Drill

for drilling lighter metals, such as in aircraft work. Optional speeds of 500, 750 and 1,000 r.p.m. can be obtained as extra. The lower speeds are recommended for stone and masonry drilling. The low speed Model 75 is furnished with a

removable auxiliary side handle for complete control under high torque. The Model 78 is a standard duty drill recommended for general purpose drilling in steel up to $\frac{3}{8}$ in. and wood up to $\frac{5}{8}$ inch. The unit produces a high torque at 750 r.p.m. for tough drilling jobs. The Model 78 is equipped with an auxiliary side handle.

holds a wide variety of blades, and the blade collet and file chuck are quickly interchangeable. The unit utilizes a stall-proof motor which, it is



Chicago CP-3017 File and Saw

File and Saw Cuts Various Materials and Shapes

Designated as the CP-3017, a 5-lb. production line file and saw which is designed specifically for filing and cutting operations has been announced by Chicago Pneumatic Tool Co., 8 E. 44th St., New York 17, N. Y. According to the manufacturer, the unit cuts every material or shape ordinarily worked by power hack saws or by hand and accommodates up to $\frac{1}{4}$ -in. round shank bench files or flat shank sizes to 13/16 x 5/32 inch. A universal chuck

claimed, provides 1,500 reciprocating $\frac{3}{4}$ -in. strokes per minute. The motor is said to afford ample power to drive any blade or file at top efficiency. A built-in speed regulator allows the selection of the proper speed range for the job.

Responsive action of the throttle in any range selected is said to permit close control. Exhaust air blows cuttings from the work area. The overall length of the tool is 14½ inches. Standard equipment includes high

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speed metalcutting blades; all-purpose blades for work in materials the nature of plaster board; a saw collet; work rest; file and chuck guard; and 1/8-in. hex Allen wrench.

Drill Chuck Is Self-Centering

A self-centering drill chuck which is designed to permit the safe and quick change of drills, reamers and other straight-shank tools while the

machine is running has been announced by The Centric Tool Co., 3407 Carolina Ave., Rockford, Ill. According to the manufacturer, no keys, collets or wrenches are necessary, and the unique design of the chuck actually increases the grip as the torque load increases. The unit utilizes three hardened, precision ground rollers, and there are no interlocking parts. The chuck is said to be ideal for either light or heavy production operations and is available with shanks of Nos. 1, 2, 3 or 4 Morse Taper.

The self-centering drill chuck

NOW greater versatility
greater efficiency

with Wells Metal Cutting Band Saws

featuring an Expanded Range of Cutting Speeds



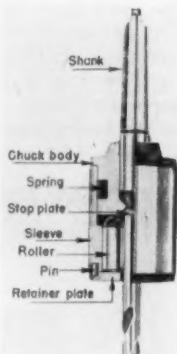
WELLS NO. 8 WITH WET CUTTING SYSTEM. NO. 5 IS SIMILAR

TO IMPROVE cutting efficiency and production, three models of the Wells Metal Cutting Band Saw line are now available with expanded range of cutting speeds as standard equipment.

The new cutting speeds coupled with such proved Wells advantages as sturdy construction, ease of operation, real dependability and low cost make these machines even more profitable for you to use. Ask your Wells Dealer for full information or write, requesting catalog G-52 giving specifications and design details for all models.



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**METAL CUTTING
BAND SAWS**
WELLS MANUFACTURING CORPORATION
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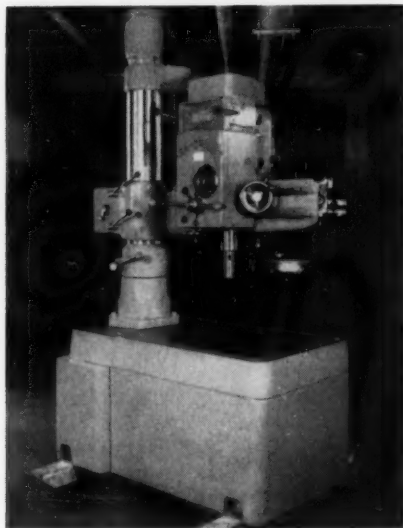


Centric Self-Centering Drill Chuck

can be supplied in one special and four standard sizes with a capacity range of from 1/32 to 3/4 inch. Diameters of the self-centering drill chuck range from 7/8 to 2 3/4 inches and the lengths are from 1 1/2 up to 3 3/4 inches.

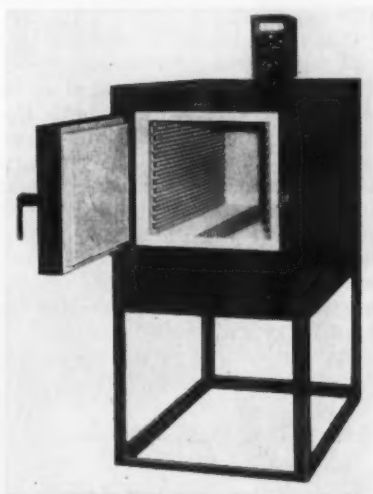
Drilling Machine Features Extra Large Table and Radial Operation

Identified as the "Ra-Drill," a drilling machine which features an extra large table and radial operation has been announced by Melvindale Tool & Die Co., Inc., 18240 Rialto, Melvindale, Mich. The machine is designed with heavily constructed alloy castings throughout for the economical production of tools, dies, jigs, fixtures and



Melvindale "Ra-Drill" Drilling Machine

similar work requiring precision and accuracy. The column is double constructed to minimize vibration and ensure accuracy, and the arm is raised and lowered by an individual motor with finger-tip control. The machine has 16 gear speeds ranging from 50 to 1,400 r.p.m. and four feed speeds of 0.002, 0.004, 0.006 and 0.010 inch. The feed speeds are handle controlled. The 28½ x 48-inch working surface is made of 6-inch heavy alloy cast iron, heavily reinforced to handle work



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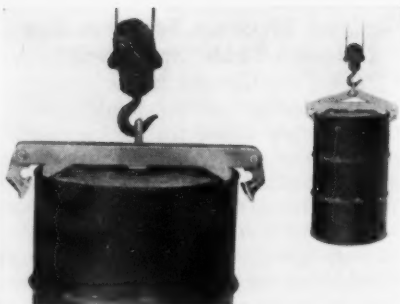
Phone Osborne 5-0411

weighing up to 5 tons. The table has three $\frac{3}{4}$ -inch T-slots and is 26 inches from the floor.

The transmission is self-contained with all operating parts sealed in oil. Gears and shafts are mounted on ball bearings running in an oil bath. Controls are mounted on the transmission face panel and sides, conveniently grouped for quick setting. All mechanism is controlled by positive acting handles, dial and wheels mounted on the transmission unit within easy reach of the operator. The machine measures 50 x 32 x 85 inches high overall and has a maximum clearance under the spindle of 32 inches. The arm is 36 inches long.

Vertical Drum Lifter Handles Open and Closed Steel Drums

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich., has announced the development of an improved vertical



Palmer-Shile Vertical Drum Lifter

drum lifter which is designed to handle open and closed steel drums in a vertical position by crane or hoist. Of all-steel welded construction, the lifter features a sure-hold safety barrel grip. According to the manufacturer, the unit saves valuable plant space and can be used for either high or low ceiling conditions.

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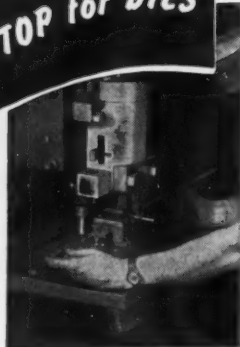
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\$175

Synthetic Water Soluble Compound for Cutting and Grinding

Designated as Vantrol 5615, a synthetic water soluble compound, for use in industrial cutting and grinding operations, which does not leave a hard deposit on machinery has been announced by Van Straaten Chemical Co., 546 W. Washington Blvd., Chicago 6, Ill. According to the manufacturer, the compound leaves a soft residue on the machine and provides for long wheel life.



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440-50 N. Oakley Blvd., Chicago 12, Ill.

Instrument Provides Accurate Control of Temperature in Electric Furnaces

Designated as the "Amplitrol," an instrument designed to give accurate and fully-automatic control of temperature in electric furnaces, ovens and other industrial heating devices has been developed by Thermo Electric Mfg. Co., 488 Huff St., Dubuque, Iowa. While utilizing the established principle of the potentiometer, there is said to be no necessity to standardize the instrument, either manually or



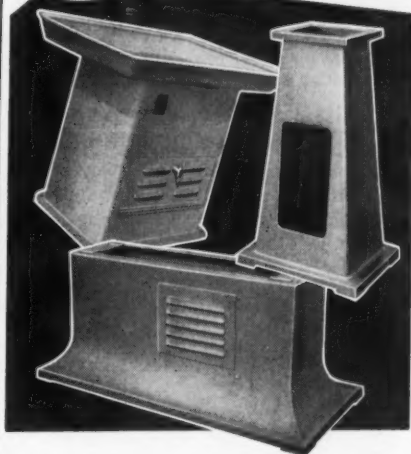
Temco "Amplitrol" Controller

automatically, at any time. All power to the unit is supplied by the service voltage. According to the manufacturer, accuracy is not dependent on the constancy of magnets, springs, bearings or other moving parts, and the instrument is immune to vibration, dust and dirt which incapacitate or cause inaccuracies in meter-type controllers. The only moving part is the relay contact.

The Amplitrol is available in two models. The Model A off-on controller is suitable for many applications to control the temperature within permissible variation. With some applications, however, the characteristics

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433 E. Pearl Street, Cincinnati 2, Ohio

of the connected equipment may be conducive to thermal inertia which may cause the temperature to overshoot and undershoot the control point. For such applications, where a minimum temperature variation is required, the Model AP proportioning controller is recommended. Each model has automatic cold junction compensation and thermocouple break protection and is designed so as to "fail safe" in the event of failure of any integral part. The instrument is available in a wide selection of scale ranges, with either Fahrenheit or Centigrade dials.

Die Steel for Deep Drawing and Forming Stainless Steel

Allegheny Ludlum Steel Corp., Oliver Bldg., Dept. MS, Pittsburgh 22, Pa., has announced the production of a die steel, designated as Ottawa 60, specifically developed to deep draw

and form stainless steel. According to the manufacturer, the die steel is a high carbon, high vanadium alloy, available in bars and forgings, which performs in such applications without galling or pickup and provides unusual wear resistance.

Improved Gear Shaver Features Air Cylinder and Handwheel Controls

An improved Red Ring Model GCR Internal Gear Shaving Machine featuring air cylinder and handwheel controls that speed gear loading and unloading functions and reduce operator fatigue has been announced by National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. The machine is designed specifically for precision shaving operations on internal spur and helical gears from 3 to 12-inch pitch diameter. Gears having up to four diametral pitch teeth and face widths up to 2½ inches can be shaved on the machine. A new cutter head and slide design on the machine includes an air cylinder control that provides fast advance and retract of the cutter head to facilitate loading and unloading of gears from the workhead. A handwheel at the front of the cutter head allows the operator to advance the cutter with one hand while simultaneously orienting the cutter with the other hand into mesh with the work gear. The new design re-

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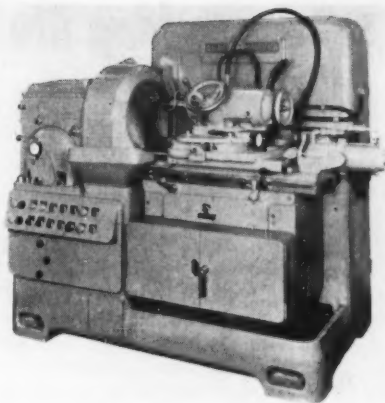
Write for details.

WADE INSTRUMENT COMPANY
Dept. M, R.F.D. No. 1, Chardon, Ohio

places a former manual toggle-type control mechanism.

The improved machine has a workhead that permits taper shaving operations. The workhead has an optional tilting feature which permits the loading and unloading of large internal gears with integral long shafts. A precision differential automatic up-feed mechanism has a master cam that acts as a step gaging device to accurately control feed increments, finished tooth size and return to backlash position.

Centralized push-button controls are provided for both setup and operation. A hinged guard with a spring assist mechanism encloses the work and cutter during the shaving operation. Change gears are provided for work spindle and cutter reciprocation drives. All electrical controls are J.I.C. standard and mounted in a panel at the rear of the machine. All pneumatic controls are in a separate com-



Improved Red Ring Model GCR Internal Gear Shaving Machine

partment in the machine base directly below the electrical panel. The machine measures 62½ inches wide x 39¾ inches deep x 64 inches high.



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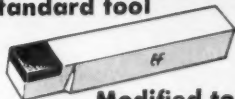
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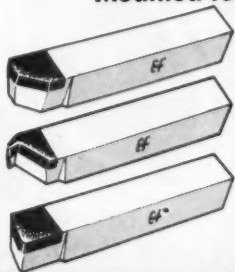
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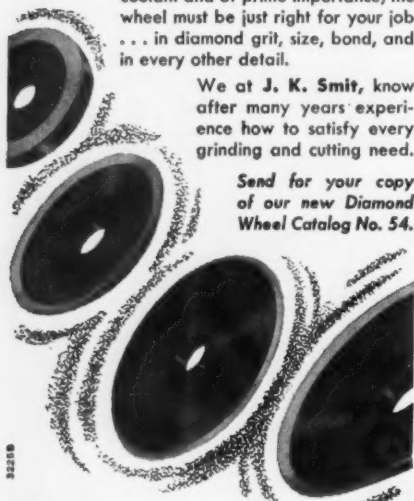
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Whether a 200 year old tortoise would admit this statement is debatable, but with Diamond Wheels it is an indisputable fact.

Even then, long wear depends upon many factors; Speed, correct use of coolant and of prime importance, the wheel must be just right for your job . . . in diamond grit, size, bond, and in every other detail.

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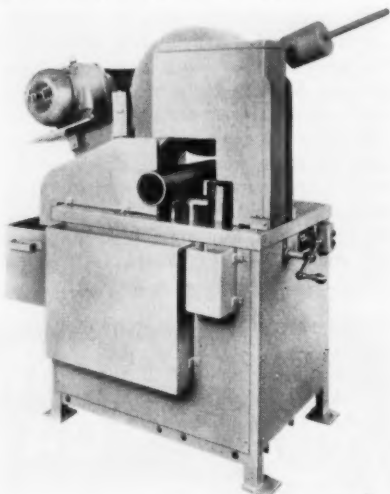
Send for your copy of our new Diamond Wheel Catalog No. 54.



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Dry Abrasive Cutting Machine Handles Material up to 4 Inches Square

Designated as the Sever-All Model No. 28, a dry abrasive cutting machine, capable of approximately 3 seconds per square inch of material being cut, has been announced by Campbell Machine Division, American Chain & Cable Co., Inc., 931 Connecticut Ave., Bridgeport 2, Conn. Available in both stationary and portable types, the ma-



Campbell Sever-All Model No. 28 Dry Abrasive Cutting Machine

chine is designed to handle material up to 4 inches square at 90 degrees to the axis for solid steel and 8 inches x 90 degrees to the axis for channels when using an 18-inch diameter cutting wheel with a 10-h.p. motor. Obviously, work size cutting capacity is reduced when a smaller diameter cutting wheel and less horsepower are used. The wheel is lowered into the work by a hand lever. The 1-inch wheel spindle is driven by V-belts.

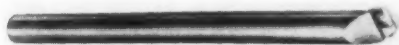
Since the Sever-All is an oscillating-type machine, the amount of abrasive

wheel contact is low and cutting is done with a minimum of pressure on the abrasive wheel, thus assuring long wheel life and clean cuts. A double-acting work holder automatically positions the material in the center of the work support, positioning the center of the workpiece in line with the center of the wheel. The material is then clamped at both sides of the cutting wheel by a hand-operated crank handle. The machine is unusually compact, measuring 56 inches front to back, 32 inches left to right and standing 62 inches high.

Carbide Boring Bar Performs Wide Range of Boring Operations

Nelco Tool Co., Inc., Manchester, Conn., has announced the development

of a carbide boring bar which is said to be ideal for a wide range of general boring applications. According to the



Nelco Carbide Boring Bar

manufacturer, the tool features hardened and ground shank to ensure maximum rigidity and accuracy, a slash milled design and nickel shim sandwich braise which eliminates tip fracture due to brazing strains. Carbide tip overhang is said to be engineered into each boring bar to minimize the grinding or snagging of steel when re-sharpening the tool. The bar is available in a complete range of sizes and carbide hardnesses.

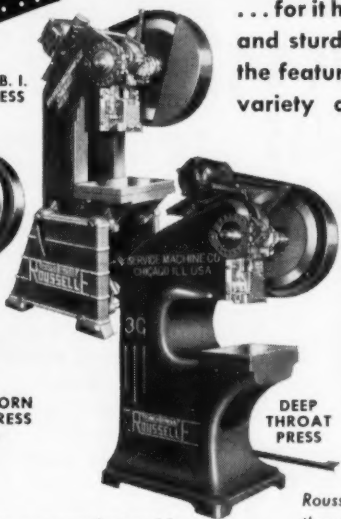
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Significant savings are often achieved if you let our engineering staff assist you. There is no obligation.

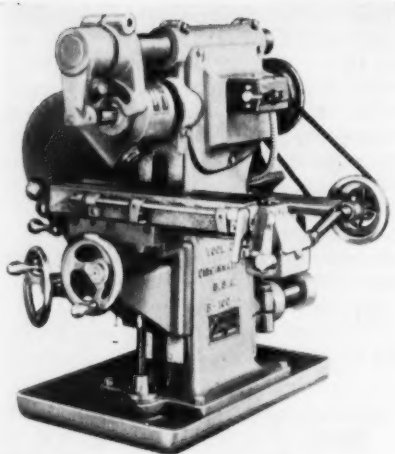
Rouselle Presses are sold exclusively through Leading Machinery Dealers

Rouselle Presses are manufactured by
SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

Vertical Milling Attachment Increases Versatility of Bench Miller

A vertical milling attachment designed to increase the versatility of Burke Bench Milling Machines has been announced by The U. S. Burke Machine Tool Division, 3 Brotherton Rd., Cincinnati 27, Ohio. Made specifically for use on the Burke No. 3 and No. 4 millers, the attachment is also said to be suitable for use on other small milling machines. The vertical attachment is activated by helical gears, with both the spindle and drive arbor supported on presealed precision roller bearings, thus permitting the high spindle speeds which are required for optimum operation using small end mills.

The attachment is driven by a splined arbor, direct from the milling machine spindle. This feature, it is claimed, allows the head to be moved close to or away from the milling machine



Burke Bench Milling Machine equipped with vertical milling attachment

spindle according to individual job requirements.

The head also is graduated so that it can be used for angular as well as direct vertical milling. A draw-in collet attachment, having a maximum capacity of $\frac{1}{2}$ inch, is furnished as standard equipment. Other collets, in sizes from $\frac{1}{8}$ to $\frac{1}{2}$ inch, in increments of $\frac{1}{16}$ inch, are available and may be used interchangeably with the other Burke accessories.



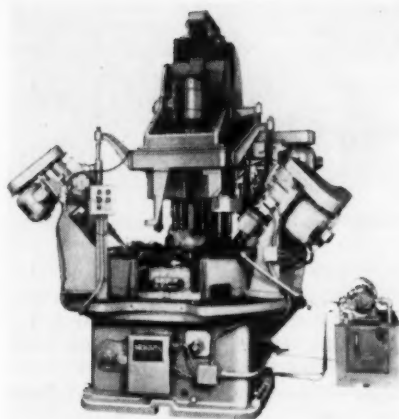
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Machine Performs 25 Operations on Carburetor Parts

One of a series of machines built to machine four-barrel carburetor parts, the Mor-Speed Production Machine, illustrated herewith, product of The Morris Machine Tool Co., 934 Harriet St., Cincinnati 3, Ohio, is designed to perform 25 operations on each carburetor body and complete 375 pieces per hour. Except for loading, transferring and unloading, operation of the machine is completely automatic. Since the left and right sides of the



Mor-Speed Production Machine for carburetor parts

carburetor body are identical, the transfer operation merely indexes the part 180 degrees, presenting the other side of the part to the spindles. The

machine has a 36-inch diameter indexing table which stops automatically at each of six stations. The tool spindles are carried in a master head with two four-spindle clusters and on radially-mounted drilling units around the outside of the table.

Among the standard units incorporated in the machine are base, indexing table, rear column, straight and angular drilling heads and hydraulic and coolant systems. Among the special elements utilized by the machine are multiple spindle tap heads which use a single standard lead screw to which the individual spindles are geared and a specially designed fixture which accurately locates the parts for machining. The load and transfer fixtures clamp with single hand-operated clamp. An automatic safety switch checks the clamping of parts. Improper clamping prevents the table from indexing. Automatic lubrication is provided for all moving parts.

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demand the ultimate
in precision**

The SV 102 { Height of Centers 4"
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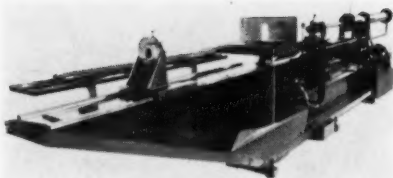
HIRSCHMANN

CARL HIRSCHMANN COMPANY, INC., 30 Park Avenue, Manhasset, N. Y.

BRANCHES: CHICAGO, DETROIT, LOS ANGELES
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Precision Machine Broaches Boring Bars up to 8 Inches in Diameter

Sturdy Broaching Service, 23516 Telegraph Rd., Detroit 19, Mich., has developed a precision horizontal broaching machine which is designed for broaching boring bars up to 8 inches in diameter, of any length, and up to 1¼ inches square. According to the manufacturer, the machine is primarily for the broaching of boring



Sturdy Precision Horizontal Broaching Machine

bars; however, its versatility and unique design makes it readily adaptable to many other precision broaching applications, especially those where internal broach surfaces have to be located in parts with irregular outside contours.

The machine base is of I-beam construction, providing maximum strength and rigidity. The follower and pull head of the ram are of fixed-in-line centers and are guided on hardened and ground steel ways. The work table is raised or lowered to suit the operation in line with the fixed center of the machine. The work table can also be rotated to any position up to and including 45 degrees. All controls and set-up adjustments are within easy reach of the operator standing at the work table. Speed and power of stroke are contained in one handy unit, easily accessible to the operator. The broaches are guided and held in position to any angle required by the follower which is graduated in degrees for quick and easy adjustment. A

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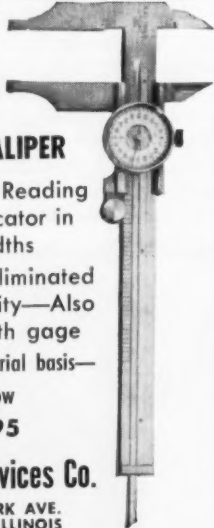
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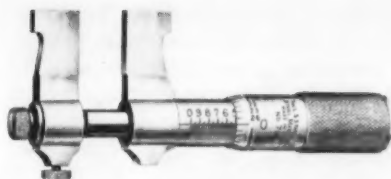
MODERN MACHINE SHOP

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floating puller, of ball and roller bearing construction, is said to allow succeeding passes to float very accurately into position, or the puller can be locked rigidly when necessary.

Inside Micrometer Caliper Has 1 to 2-Inch Range

Designated as the No. 700, an inside micrometer caliper which has a range of from 1 to 2 inches by thousandths of an inch has been announced by The L. S. Starrett Co., Athol, Mass. Precision measuring of hole diameters and linear dimensions between inside surfaces, it is claimed, can be accomplished quickly and easily with the instrument. According to the manufacturer, the caliper combines the convenience and quick-reading features of a micrometer with vernier caliper-style jaws in a tool that is compact, nicely balanced and easy to use around precision work.

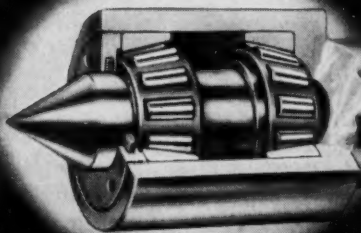


Starrett No. 700 2-Inch Inside Micrometer Caliper

The jaws of the caliper are hardened for resistance to wear and ground on a radius for accurate "feel" without cramping. No-glare satin chrome finish is said to eliminate glare and eye strain and makes the tool easy to read in any light. The finish also resists stains, corrosion and rust. Other features of the instrument include quick-reading figures with every thousandth numbered, one-piece spindle with hardened threads ground from the solid and a stabilized lock screw.

... heavy loads at high speeds

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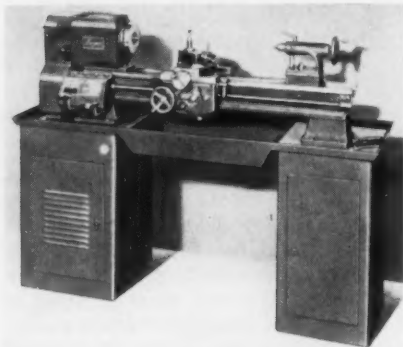
Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.



FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

Lathes Feature Extreme Smoothness in Operation

Identified as the "2500" Series, a line of 12-inch lathes which features ex-



Logan "2500" Series 12-Inch Lathe

treme smoothness in operation has been announced by Logan Engineering Co., Lawrence and Lamson Ave., Chicago 30, Ill. According to the manufacturer, the unusual strength of the lathes is distributed through wide gears, large shafts, heavy bearing supports, heavy base and at other points, resulting in maximum power, smoothness and minimum vibration. The line consists of eight lathes, four turret and four screw-cutting models. Principal specifications of each lathe are 12-inch swing over the bed; 7 1/4-inch swing over the saddle; 1 3/8-inch spindle hole; 1-inch collet capacity; and 23 and 35-inch centers. A variable speed drive or standard double V-belt drive can be supplied.

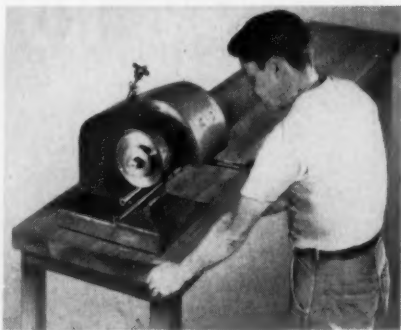
Each lathe has a trim cabinet with a large chip capacity, drop center pan and three handy storage compartments completely enclosed. The precision carriage rides on a two-V-way, two-flat-way bed that is said to be rugged, rigid, precision ground and warp free. The massive special alloy spindle turns on a double row of over-

size ball bearings. No bearing adjustment is claimed to be needed for any spindle speed within the wide r.p.m. range of the machine.

Bench-Type Machine Cuts up to 1,000 Pieces of 1 1/4-Inch O.D. Pipe Per Hour

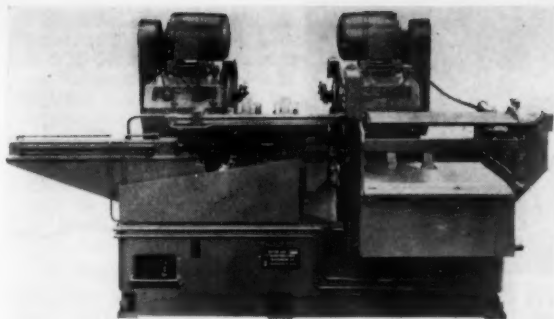
Production cutting of up to 1,000 pieces of 1 1/4-inch o.d. pipe per hour is claimed for a bench-type pipe and tube cut-off machine manufactured by Continental Machine Co., 1952 N. Maud Ave., Chicago 14, Ill. According to the manufacturer, the machine is designed to cut all sizes from 3/8 to 1 1/4-inch o.d. pipe and tube, from light gauge to 12-gauge wall thicknesses. Drive is by a 1/4-h.p. gear-headed motor, and the electrical cord connects to 115-volt a.c. outlet. The machine utilizes a tempered cutting wheel which is 7 inches in diameter.

An easily adjustable depth regulator is said to limit the downward cutting stroke and protects the wheel and the rollers. The machine also has an ad-



Continental Bench-Type Pipe and Tube Cut-Off Machine in use

justable stop and length gauge assembly for accurately controlling the length of pipe cut. The machine measures 16 x 14 x 20 inches high.



**Motch & Merryweather Model
3-D Automatic Duplex
Cropping Saw**

Automatic Duplex Cropping Saw for 8-Inch Shell Forgings

Identified as the Model 3-D, a machine which is supplied with two sawing heads, one right and one left-hand, arranged for automatic simultaneous cropping of both ends of an 8-in. shell forging has been announced by The Motch & Merryweather Machinery Co., Manufacturing Division, Penton Bldg., Cleveland 13, Ohio.

The sawing heads of the machine have nine spindle speeds, multiple disc clutch for engaging the spindle drive and self-contained lubrication system to all bearing points. The base of the machine is of heavy-duty welded steel fabrication, stress-relieved and normalized with coolant sump and ample chip compartments provided. Shell forgings are magazine loaded from the customer's conveyor and individually passed into the loading position by an escape mechanism.

A hydraulically actuated loading ram pushes the shell into the clamping station where it is positively located to the nose of the cavity by means of a hydraulically operated locating rod. Over-head, lever-type clamps are then actuated, securely clamping the part in the machining position, and the locating rod withdrawn from the shell cavity. Sawing heads then feed forward, cutting the excess material from both the base and

nose end of the shell forging. Upon completion of the cut, the saw heads rapid traverse return to the starting position, clamps open and hydraulically operated unloading mechanism

transfers the finished shell into a roller-type discharge chute. The automatic cycle of the machine continues as long as pieces remain in the loader.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

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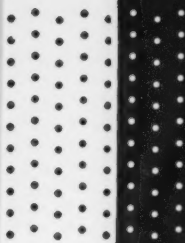
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new literature

1. Uniflute Countersink, made of high speed steel for deburring and countersinking operations is described in a bulletin (No. HHS 408) issued by M. A. Ford Mfg. Co., Inc., 744 W. River St., Davenport, Iowa.

2. Turning Tools, Backrests, Tap and Die Holders, Tool Posts, Cut-Off Blade Holders, Recessing Tools, Stops, Drill Holders and Knurling Tools are described in a catalog published by R and L Tools, 1825 Bristol St., Philadelphia 40, Pennsylvania.

3. Cemented Carbide Tools and Blanks are listed in a publication (Brief-A-Log GT-285) released by Carbology Department of General Electric Co., 11143 E. 8 Mile St., Detroit 32, Michigan.

4. Center Hole Chart which was reprinted to conform with the recently adopted drill standards has been issued by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Connecticut.

5. Spot and Projection Bench Welders are described in a bulletin published by Precision Welder & Flexopress Corp., 138 E. McMicken Ave., Cincinnati 10, Ohio. Specifications are included.

6. Air and Hydraulic Cylinders. A comprehensive price list covering its complete line of stock air and hydraulic cylinders is available from Miller Fluid Power Co., 2040 N. Hawthorne Ave., Melrose Park, Illinois.

7. Quick-Change Adjustable Multiple Drill Head which is entirely gear driven and which is available with from two to eight spindles is described in literature published by Wisconsin Drill Head Co., Butler, Wisconsin.

8. Racks and Stacking Boxes for better parts handling and for conserving valuable space are described in a catalog published by Sterling Factory Equipment Co., 183 Charles St., Providence, Rhode Island.

9. Centerless Grinding Machine, identified as the Filmatic No. 2, for grinding accurately to close limits is described in a publication (No. G-644) prepared by Cincinnati Grinders Inc., Cincinnati 9, Ohio.

10. Cutting and Grinding Data Book describing the advantages of wax in metalworking, as well as the comparative machinability rating of various steel grades has been issued by S. C. Johnson & Son, Inc., Racine, Wisconsin.

11. Hydraulic Cylinders recommended for 1,500 p.s.i. maximum oil service are described in a catalog (No. 106) released by Rivett Lathe & Grinder, Inc., Dept. MMR, Brighton 35, Boston, Mass. Specifications are included.

12. Flexible Shaft Machines and Accessories are described in a catalog (No. C-210) released by Franklin Balmar Corp., N. A. Strand Division, Woodberry, Baltimore 11, Maryland.

13. Cored, Bar and Plate Stock, designated as 597 Oilite, is described in a catalog (No. CB-54-1) issued by Amplex Division, Chrysler Corp., Dept. 173, Detroit 31, Michigan.

14. Splicer, identified as the "Weld-A-Matic," for continuous strip splicing lines and building up coils to larger sizes is described in a bulletin (No. 43) prepared by E. W. Bliss Co., Rolling Mill Division, Salem, Ohio.

USE CARD FOR FREE LITERATURE 

15. Production Machines. The Morris Machine Tool Co., 934 Harriet St., Cincinnati 3, Ohio, has issued a folder containing catalogs on its line of Mor-Speed production machines which combine various operations.

16. Hand Miller for quickly and accurately handling light cuts in brass, aluminum, steel, plastics and other materials is described in a circular released by H. B. Rouse & Co., 2214 N. Wayne Ave., Chicago 14, Illinois.

17. Tapping Head. The Charles L. Jarvis Co., Middletown, Conn., has published a catalog describing its improved Super Torqomatic Tapping Head, a torsionally driven unit that operates without pressure on the tap itself.

18. Involute Gear Checkers, identified as the "Sine-Line," for checking the involute form on helical and spur gears up to 36 inches in diameter are described in a bulletin (No. MIC-54) issued by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Michigan.

19. Precision Lathes, Micro-Drill Presses, Micro-Drills and Watchmakers' Tools are described in a catalog (No. M) released by Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif. Specifications are included.

20. Portable Brinell Hardness Tester which makes standard Brinell tests and can be used as a bench tester or taken to the job and used in any position is described in a folder published by Andrew King, 67 E. Lancaster Ave., Ardmore, Pennsylvania.

21. Temperature Cabinets for cold and heat requirements with temperature ranges from minus 200 to plus 300 deg. F. are described in a bulletin published by Trop-Arctic Temperature Products, Dept. B-294, 627 S. Mulberry St., Muncie, Ind. Complete specifications are included in the bulletin.

22. Universal Expanding Mandrels, designated as the "Count-Centric," are described in a folder released by The Le Count Tool Works, Inc., 390 Capitol Ave., Hartford, Conn. Specifications and line drawings are included.

23. Squaring Shears, Shear Accessories, Power Press Brakes and Hydraulic Compression Molding Presses are fully described in a file of literature available from Columbia Division, The Lodge & Shipley Co., Hamilton, Ohio. Specifications are included.

24. Heavy-Duty Vises for use on milling machines and other machine tools are described in literature released by Wilton Tool Mfg. Co., Inc., 925-941 Wrightwood Ave., Chicago 14, Illinois.

25. Standard End Mills, Reamers, Counterbores and Holders are described and illustrated in a catalog (No. 55) released by Putnam Tool Co., 2981 Charlevoix Ave., Detroit 7, Mich. Specifications and price information are included.

26. Lattice Braid Rod and Shaft Packings, available in various materials, sizes and forms, are described in a bulletin (No. A-131) published by The Garlock Packing Co., Palmyra, N. Y. Complete specifications are included.

MODERN MACHINE SHOP

JANUARY, 1955

(THIS CARD MUST BE USED BEFORE MARCH 1, 1955)

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27. **Guide Pin Bushings and Guide Pins** are illustrated and described in a catalog published by Lamina Dies and Tools, Inc., P.O. Box 31, Royal Oak, Mich. Complete specifications and line drawings are included.

28. **Plain and Universal Milling Machines**, designated as the Model CE, which feature efficiency of operation, ease of operation and economy of operation are described in a catalog (No. CE-10) issued by Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

29. **Carbide-Tipped Tools**, including drills, reamers, counterbores and spot facers, are described in a booklet released by The Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, Ohio. Complete specifications are included.

30. **Profile Grinder**. Union Twist Drill Co., Athol, Mass., has published a bulletin (No. TPG-3) describing and illustrating its No. 3 Tangent-Arc Profile Grinder which grinds radii on all cutters requiring radii. Specifications are included.

31. **Indexing Turntables and Variable Speed Controls** are described and illustrated in a catalog (No. 88-55) prepared by Eisler Engineering Co., Inc., 734 S. 13th St., Newark 3, New Jersey.

32. **Small, High Power, Unidirectional Motors**, identified as the Type YAF, which are available in nine power ratings from 1/200 to 1/40 h.p. are described in a condensed catalog (No. F 4271-5) issued by Barber-Colman Co., Small Motors Division, 651 Rock St., Rockford, Illinois.

33. **Collet Stops and Spindle Lathe Stops** are described and illustrated in a bulletin published by Wohlnip Products, Inc., 390 Hillside Ave., Hillside, N. J. Line drawings, prices and specifications are included in the bulletin.

34. **Turning Machines** for repetitive high production, precision in the toolroom and small lot production are described and illustrated in a catalog released by The Monarch Machine Tool Co., Sidney, Ohio. Complete specifications are included.

35. **Gage Indicator Points** with permanently fused tungsten carbide balls are described in a catalog published by Westfield Gage Co., 53 Church St., Westfield, Massachusetts.

36. **Fully-Automatic Proportional Wattage Control**, identified as "Power-O-Matic," for straight line temperature control throughout the entire oven range is described in a brochure released by Blue M Electric Co., 138th and Chatham St., Blue Island, Ill. Specifications are included.

37. **Spindle Braking Motor**. The Nebel Machine Tool Co., 3409 Central Parkway, Cincinnati 25, Ohio, has issued a catalog describing the Dinabrake Motor which is said to stop the spindle of Nebel lathes smoothly in 10 degrees of arc.

38. **Honing Equipment**. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 38, Mich., has issued a catalog describing its services, as well as its line of Microhoning and Microflat Equipment. Specifications are included.

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39. Hole Punching Units. Wales-Strip-pit Corp., 398 Payne Ave., North Tona-wanda, N. Y., has issued a bulletin (No. JD) which describes the Wales Type "JD" Hole Punching Units.

40. Metal Forming Machine, identified as the "Curvette," for wire, strip, bar, angles, channel or tubing is described in a catalog released by Lund Products Division of Artys Sales Co., 11 Broadway, New York 4, New York.

41. Sand Blast Generators and Cabinets, Abrasive Elevators, Sanitary Blast Machines, Welding Fume Collectors and Dust Filters are described in a bulletin (No. 100A) published by Ruemelin Mfg. Co., 3996 N. Palmer St., Milwaukee 12, Wisconsin.

42. Quenching Oil, designated as No. 11, suitable for quenching systems requiring a high flash point, is described in a bulletin (No. 29) issued by Sun Oil Co., Philadelphia 3, Pennsylvania.

43. Air Tools for the foundry, steel mill, production line or assembly plant are described in a bulletin (No. 38-A) released by The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.

44. Precision-Ground Reamers, including hand, shell, expansion, taper pin, stub, chucking, decimal and dowel pin types, are covered in a catalog issued by The DoAll Co., Des Plaines, Illinois.

45. Alloys Application Data Booklet. Cerro de Pasco Corp., Dept. 10, 40 Wall St., New York 5, N. Y., has issued a data booklet covering Cerro alloys.

46. Seamless or Welded Stainless Mechanical Tubing is described in a folder (No. TB 365) available from Tubular Products Division of The Babcock & Wilcox Co., Beaver Falls, Pennsylvania.

47. Heavy-Duty Pantograph Engraver, identified as the Model D-2, is described in a brochure published by Green Instrument Co., 392 Putnam Ave., Cambridge, Massachusetts.

48. Quick-Reference Comparison Chart, listing overall, flute and assembled lengths of drills has been released by Chicago-Latrobe, 419 W. Ontario St., Chicago 10, Illinois.

49. Heavy-Duty Machine Tools are described in a bulletin (No. G-21) issued by Consolidated Machine Tool Corp., subsidiary of Farrel-Birmingham Co., Inc., Rochester 10, New York.

50. Hardware. Atkins Saw Division, Borg-Warner Corp., Indianapolis 9, Ind., has issued a hardware catalog which presents all the necessary information on hardware in an easy-to-read manner.

51. Radial Head Face Grinder featuring an automatically controlled grinding cycle, is described in a bulletin (No. 700) released by Besly-Welles Corp., 108 Dearborn Ave., Beloit, Wisconsin.

52. Fasteners, including special rivets, nails, screws and small parts, are described in a catalog (No. 58) published by John Hassall, Inc., P.O. Box 2177, Westbury, Long Island, New York.

53. Universal Power Groover, identified as the Model 48-U, is fully described in a bulletin (No. 76-B) issued by Niagara Machine & Tool Works, Buffalo 11, N. Y.

54. Ram-Turret Duplex Milling Machine, designated as the Model 10 RH, is described in a circular (No. 11) published by Fray Machine Tool Co., 2935 N. Ontario St., Burbank, California.

55. "Handy Guide to Aid in Selecting and Operating Di-Acro Brakes" is the title of a brochure released by O'Neil-Irwin Mfg. Co., 306 8th Ave., Lake City, Minnesota.

56. Stainless and High Alloy Tubing, ranging in size from $\frac{1}{8}$ to 40 inches o.d., is described in a booklet issued by Crucible Steel Company of America, Dept. MS, Oliver Bldg., Pittsburgh 22, Pa.

57. Automatic Milling Machine, identified as the "Mill-Matic," for automatic manufacturing or production-type milling operations, is described in a brochure issued by The Producto Machine Co., 910 Housatonic Ave., Bridgeport 1, Conn.

58. "Practical Design for Welding," a reprint presenting principles designer to use in designing welded steel machine parts and machinery, is available from The Lincoln Electric Co., Cleveland 17, Ohio.

59. "34 Practical Production Ideas to Help You Increase Output and Reduce Costs" is the title of a bulletin (No. 154) released by Potter & Johnston Co., Pawtucket, Rhode Island.

60. Engines, designed for standby or continuous power in generator, blower or pump service in industrial installations, are described in a bulletin (No. E-7) issued by Le Roi Division of Westinghouse Air Brake Co., Milwaukee 14, Wisconsin.



USE CARD FOR FREE LITERATURE

metalworking news in brief

The appointment of **Dr. Maurice J. Day** as director of research and development has been announced by Crucible Steel Company of America, Pittsburgh, Pa. Dr. Day was formerly associated with the Armour Research Foundation of the Illinois Institute of Technology where he was assistant director in charge of program development.

— o —

Irving G. Meyer, Homecraft products manager for Rockwell Mfg. Co., Delta Power Tool Division, Pittsburgh, Pa., has been promoted to assistant to the vice president in charge of the division. Mr. Meyer will be responsible for maintaining liaison between the division's national sales headquarters offices and five regional sales offices.

— o —

The appointment of **Paul I. Birchard** as vice president and general manager of the Le Roi Division, Milwaukee, Wis., has been announced by Westinghouse Air Brake Company. Mr. Birchard will replace **Edward J. Green** who has been temporary general manager of Le Roi since the resignation of **T. O. Liebscher**, former president of Le Roi Company.

— o —

Two new field offices in southern cities are being established by The Bellows Co., Akron, Ohio. **Elwood E. Zerbe** will be the Bellows field engineer in Birmingham, Alabama, and **Henry W. Poburka** will be in charge of a similar office in Richmond, Virginia.

Butterfield Division, Union Twist Drill Co., Derby Line, Vt., has announced the appointment of **Jordan P. Freemantle** as sales engineer in the New York and northern New Jersey area. Mr. Freemantle's headquarters will be in New York City.

— o —

The appointment of **Lester G. Weidler**, tool engineer, to the sales engineering staff of the Indianapolis district has been announced by Wesson Co., Detroit, Mich. Mr. Weidler's headquarters in Indianapolis will be Box 264, Rural Route No. 2, Bridgeport, Indiana.

— o —

Clifford S. Anderson, advisory counsel for Norton Co., Worcester, Mass., died recently. Mr. Anderson, associated with Norton since 1911, was successively assistant counsel, counsel and general counsel and became advisory counsel in 1947. He had also been secretary and clerk of the board of directors.

— o —

Robert Potter, vice president and manager of the Salem, Ohio, Division of E. W. Bliss Company, has been appointed to the office of assistant executive vice president. In his new capacity, Mr. Potter will assist in the general supervision of the manufacturing divisions and subsidiaries of Bliss. **George Perrault, Jr.**, sales manager of the Rolling Mill Division at Salem, will assume the duties of division manager of the Salem Division.

Metalworking News in Brief

Kling Brothers Engineering Works, Chicago, Ill., has announced the appointment of the following as west coast distributors: **Harron, Rickard & McCone Company of Southern California**, 3850 Santa Fe Ave., Los Angeles, Calif., for the southern California territory; **Harron, Rickard & McCone Company of Northern California**, 2070 Bryant St., San Francisco, Calif., for the northern California area; and **Dawson Machine Co.**, 5700 First Ave., S., Seattle, Wash., for the northwest area.

— o —

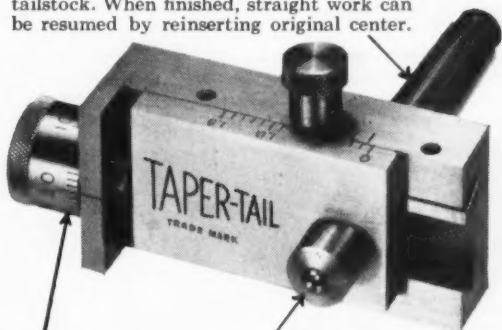
Max E. Hartl, Atlantic district magnetic materials representative for Carboly Department of General Electric Co., Detroit, Mich., has been named manager of magnetic materials sales with headquarters in Detroit. Mr. Hartl succeeds **E. L. Hubbard** who has been assigned to develop magnet sales on the west coast. In the shift, **W. S. Gripman** from the Detroit office will take over Mr. Hartl's position in the Atlantic district, and **J. C. Betts** will be transferred from Detroit to the east central district office in Cleveland.

George O. Kuhlke, leading authority on factory operations and expansion in the field of electronics and precision instruments, has left Arma Corporation to establish a new business at 251 Drexel Ave., Westbury, N. Y. Mr. Kuhlke will be available as a management and business consultant and will specialize in industrial development and expansion and counseling on finance, government contracts, personnel relations, factory operations and corporate management procedure.

Now! Cut Tapers This Fast, Easy Way!

1. NO DISTURBANCE OF TAILSTOCK ALIGNMENT.

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Metalworking News in Brief

Clarence E. Hawke, vice president of The Carborundum Company and general manager of Carborundum's Refractories Division in Perth Amboy, New Jersey, has retired from active direction of the Refractories Division. **Boyd M. Johnson**, formerly assistant general manager, has been appointed general manager of the division.

— o —

E. W. Bliss Co., Canton, Ohio, has announced the appointment of **C. A. Chamberlain** to the position of secretary. Mr. Chamberlain will assume his new duties in addition to those of assistant to the president, a position he has held since January, 1954.

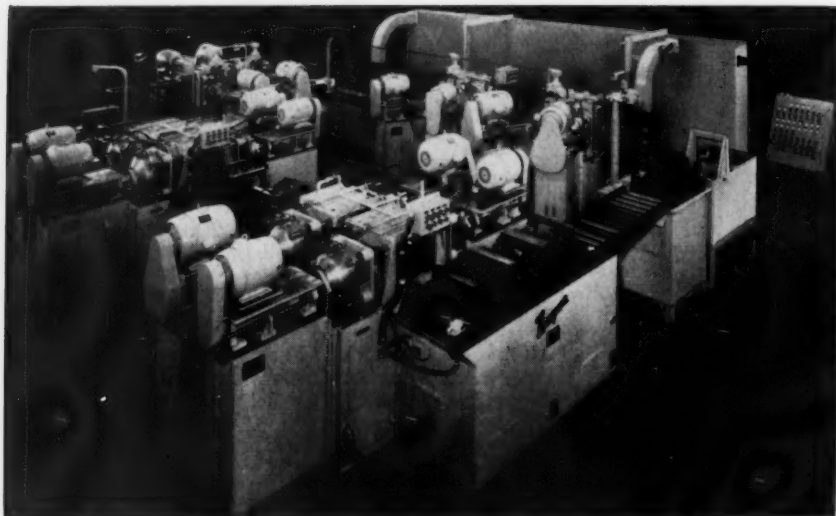
Theodore H. Bourguignon, a veteran of 13 years in all departments of Standard Pressed Steel Co., Jenkintown, Pa., has been promoted to the company's outside sales staff. Mr. Bourguignon will have his headquarters in Indianapolis and will cover southern Indiana, southwestern Ohio and all of Kentucky. **Donald C. Buecker**, who recently joined SPS, has been appointed to the sales force and will be assigned to the Minneapolis office, covering all of Minnesota and western Wisconsin.

— o —

Bridgeport Brass Co., Bridgeport, Conn., has announced the appointment of **N. Bross Decker** as manager of its Boston district sales office.

Pallet-Type Transfer Machine for Producing Typewriter Frames

THE pallet-type transfer machine shown herewith is designed to drill, ream, and tap varying size holes at varying angles in typewriter frames. The "track" is approximately 100 ft. in length and occupies approximately 25 ft. x 25 ft. square. The frames are processed from the raw casting through the washing and cleaning operation. Built by Zagar Tool, Inc., Cleveland, Ohio, the machine has a total of 224 spindles and accommodates 26 pallets when fully loaded. Each pallet delivers two completed frames every 30 seconds. Eight double stations perform 16 different operations.



Metalworking News in Brief

George M. Meriwether, 1712 Seventh Ave., N., Birmingham, Ala., industrial equipment representative, has been appointed by Mattison Machine Works, Rockford, Ill., for the entire State of Alabama. With a staff of six sales and service engineers, the Meriwether firm will offer improved service in the area to industries using Mattison grinders.

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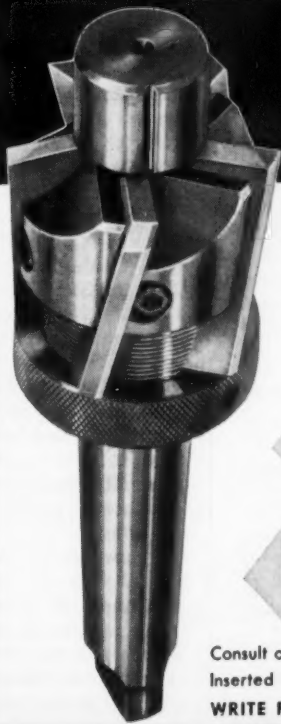
George W. Kessler has been appointed chief engineer of The Babcock & Wilcox Company's Boiler Division. Formerly assistant chief engineer, Mr. Kessler has been associated with the company since 1930.

— 0 —

At a meeting of the directors of Vanadium-Alloys Steel Canada Limited, **J. Gordon Barker** was elected president of the company. **J. P. Gill**, president of the American parent company, Vanadium-Alloys Steel Co., Latrobe, Pa., who has been serving as president of Vanadium-Alloys Steel Canada, has become chairman of the board for the Canadian company.

The opening of a new warehouse and office in Los Angeles, California, has been announced by **Henry Disston & Sons, Inc.**, Philadelphia, Pa. Located at 403 E. Washington Boulevard, the new warehouse will stock a complete line of industrial products for cutting wood and metal. The new Los Angeles operation is under the supervision of **Harold Spurgeon** who has represented Disston for many years in this territory.

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Metalworking News in Brief

Crucible Steel Company of America, Pittsburgh, Pa., has announced the appointment of **Robert M. Simpson** as manager of its San Francisco sales branch, succeeding the late **H. G. Bain**. Mr. Simpson was formerly assistant manager of the San Francisco branch.

— o —

Ralph B. Billingham, Jr., has been appointed sales manager of the automation section of the W. F. & John Barnes Co., Rockford, Ill. Mr. Billingham was formerly assistant sales manager of the automation section.

— o —

The Federal Machine and Welder Co., Warren, Ohio, has announced the election of **David A. Wallace** as a director of the company. Mr. Wallace was president of Chrysler Division, Chrysler Corporation until his retirement.

— o —

Dr. Richard H. Patch, vice president of operations, E. F. Houghton & Co., Philadelphia, Pa., died recently in Hot Springs, Arkansas, at 66 years of age. Dr. Patch had been associated with Houghton since 1926.



National Twist Drill & Tool Co., Rochester, Mich., has announced that **Carl J. Oxford**, formerly chief engineer and a director of the company, has been appointed vice president in charge of engineering.

— o —

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **R. W. Powell** as general sales manager of its Machinery Division, which includes the Metalworking and Process Press Division, the Plastics Machinery Division and the Die Casting Machinery Division. Mr. Powell has been associated with H-P-M for the past 18 years.

— o —

Firth Sterling Inc., Pittsburgh, Pa., has announced the retirement of **A. C. Wickman** of Toronto, Canada, as a director of the company. Mr. Wickman was the former president of A. C. Wickman, Ltd., Coventry, England, and recently chairman of A. C. Wickman, Canada, Ltd. **D. Dean McCormick**, senior partner of McCormick & Co., Chicago, Ill., has been named to succeed Mr. Wickman.

— o —

Kennametal Inc., Latrobe, Pa., has announced that the Indianapolis office of its Cincinnati district is now known as the Indianapolis branch. **Frank Hull**, who has been a representative in the Cleveland district, will serve as branch manager. **George Sundell**, who has been a service engineer in the Buffalo area, is moving to Indianapolis as representative.

— o —

Donald K. Miner, formerly a jet engine materials engineer with General Electric's Aircraft Gas Turbine Division, and **J. David Benedict**, who transferred from Carboloy's permanent magnet operations, have been added to the newly-formed vacuum-melted alloys section of Carboloy Department of General Electric Co., Detroit, Michigan.

Metalworking News in Brief

The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, has announced the appointment of **Harold J. Siekmann** as vice president. Associated with LeBlond since 1911, Mr. Siekmann became chief engineer in 1944, the duties of which he will retain in his new position.

— o —

Raymond Shile has been appointed manager of the new eastern sales office of Palmer-Shile Company at 550 Fifth Ave., New York 36, New York.

— o —

The appointment of **A. D. Moncrieff** as manager of the machine tool and cutting tool divisions and **Clayton E. Scott** as chief engineer has been announced by Michigan Tool Co., Detroit, Mich. The company has also announced that **Charles R. Staub**, chief engineer since 1936, has been named staff consultant.

— o —

Barnes Drill Co., Rockford, Ill., has announced the opening of a new sales office, located at 3419 S. Telegraph Rd., Dearborn, Mich., to serve the Detroit area and all of eastern Michigan. The office will be managed by **C. O. Holland**, assisted by **Hill Nelson**, **Curt Kahler**, **Jack Gamrath**, **R. W. Losey** and **R. M. Palmer**.

— o —

Detroit Die Set Corp., Detroit, Mich., has been appointed authorized distributor of the new self-oiling guide pin bushings manufactured by the Powdered Metal Parts Division of Allied Products Corporation.

— o —

Roy Dehn, formerly chief engineer of the Heavy Machinery Division, has been appointed director of engineering of The Cleveland Crane & Engineering Co., Wickliffe, Ohio. **Alfred W. Schultz** succeeds Mr. Dehn as head of heavy overhead traveling crane, press and shear engineering.



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Metalworking News in Brief

Le Roi Division of Westinghouse Air Brake Co., Milwaukee, Wis., has named **Don S. Permar** to the newly created post of field sales manager. In his new position, Mr. Permar will have overall responsibility in managing the Le Roi field sales organization.

— o —

Robert M. Stecker has joined the grinding wheel sales staff of Electro Refractories & Abrasives Corp., Buffalo, N. Y. Mr. Stecker, making his headquarters in Milwaukee, has been assigned the Wisconsin territory.

— o —

Frank Scheffler, Size Control Company representative in Texas, has renamed the company bearing his name. The new corporate name is **Southwest Industrial Sales Co.**, 2526 Mocking Bird Lane, P.O. Box 6851, Dallas 19, Texas.

— o —

The appointment of **Leo B. Zaremba** as production manager and **William N. Lesnew** as shop superintendent has been announced by Formsprag Co., Van Dyke, Michigan.

Maurice Olsaver has been appointed sales manager of Aget Mfg. Co., Adrian, Mich. Associated with Aget for over 10 years, Mr. Olsaver will head the company's newly reorganized sales department which was recently moved from Ann Arbor to the Adrian plant.

— o —

The Jacobs Mfg. Co., West Hartford, Conn., has announced the retirement of **Raymond A. Clark** after 30 years of service with the firm. Mr. Clark was formerly Chicago district manager.

— o —

The appointment of **Lyman K. Shepard** as sales manager has been announced by Wisconsin Drill Head Co., Butler, Wis. Mr. Shepard was formerly sales manager of the Drill Unit Division of Rockwell Mfg. Co., Pittsburgh, Pennsylvania.

— o —

The appointment of **Bearing Engineering Company** of San Francisco and Oakland as the exclusive distributor for Waldes Truarc retaining rings and other products in northern California has been announced by Waldes Kohinoor, Inc., Long Island City, New York.



Abrasive Cut-Off Wheel Cuts Wire Rope

THE accompanying illustration shows a piece of wire rope for the logging industry of the Pacific Northwest being setup for cutting in a 10 h.p. DeWalt cutting-off machine. The wheel used in performing this job is a Norton 16 x 5/32 x 1-in. A 24-V10BN resinoid Norflex wheel which operates at a speed of 3,425 r.p.m., cutting the wire rope quickly and easily without deforming or unraveling the individual wires. In the illustration, the wheel guard is raised to show details of the operation

Metalworking News in Brief

E. W. Bliss Co., Canton, Ohio, has announced the appointment of **Arthur Sansom** to the sales engineering staff of the Can Machinery Division, New York, N. Y. Prior to his recent association with Bliss, Mr. Sansom was the New York representative for the Fairchild Aircraft Division, Hagerstown, Maryland.

— o —

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **Norman Engineering Co.**, 2115 W. Marquette Rd., Chicago 36, Ill., as representative for its Hydraulic Power Division line of products.

— o —

George M. Roberts, machinery sales executive in the Atlanta, Georgia, area for the past 16 years, has been named Charlotte (N. C.) district sales manager of Rockwell Manufacturing Company's Delta Power Tool Division.

— o —

Behr-Manning Corp., Troy, N. Y., has announced that **Edwin C. Evans** has been made vice president and assistant general manager and **William I. Clark, Jr.**, has become assistant to the president in addition to his present responsibilities as secretary.

— o —

The S-P Mfg. Corp., Cleveland, Ohio, has announced the appointment of **Kelburn Engineering Co.**, 600 W. Jackson Blvd., Chicago, Ill., as exclusive sales representative for S-P air and hydraulic cylinders in the Chicago territory. Tool Equipment Company will continue as representative for S-P power chucking equipment in the same territory.

— o —

To market its line of Firthite tips, tools and blanks, high speed toolholder bits, ground flat stock and drill rod, Firth Sterling Inc., Pittsburgh, Pa., has announced the appointment of the

following eight new distributors: **Frey Industrial Supply Co.**, Los Angeles, for the west coast area; **A. J. Glesener Co., Inc.**, San Francisco, for the Bay and northern California territories; **Chandler & Farquhar Co.**, Boston, for eastern Massachusetts, Maine and New Hampshire; **Electric Tool & Machinery Co.**, Baltimore, for the Baltimore area; **Farquhar Machinery Co., Inc.**, Jacksonville, for the Florida territory; **Brammell Supply Co.**, Benton Harbor, Mich., for southwestern Michigan; **E. C. Blackstone Co.**, Memphis, for Memphis, northern Mississippi and Arkansas; and **Losey and Co.**, Easton, Pa., for eastern Pennsylvania.

— o —

American Machine and Solvents Co., Inc., Yonkers, N. Y., has been appointed exclusive distributor of Brown Vertical Milling Heads in all eastern states. Display and service headquarters have been set up and stock is maintained for immediate shipment.

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Book reviews

Diesel Engine Operation and Maintenance. By Vladimir L. Maleev. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 504 pages. Illustrated. Cloth binding, board covers. Price, \$8.50.

The complete story on diesel engines—what makes them run and what it takes to keep them running smoothly—is brought together in this book. It gives a clear understanding of principles behind the work of a diesel en-

gine and describes the design and function of its main components. Differences between various types of engines and their modes of operations are fully explained. On the practical side, the book explains how to maintain a diesel engine in top working condition, how to operate it efficiently, how to quickly make successful repairs and when and how to overhaul it. The book uses only simplest mathematical calculations, and these are kept to a minimum. Every phase of diesel engines is thoroughly covered in great detail, yet the author's style is concise and easy to understand.

All of the latest developments in the diesel engine field are discussed to make this work a fully comprehensive manual. This authoritative book is designed to provide a good grounding in theory of diesel engine operation, plus a working familiarity with its construction and use.

Machine Shop Operations and Setups. By Harold W. Porter, Charles H. Lawshe and Orville D. Lascoe. Published by the American Technical Society, 848 E. 58th St., Chicago 37, Ill. 397 pages. Illustrated. Cloth binding, board covers. Price, \$5.50.

This book is designed to meet the specific requirements of modern instruction in machine shop techniques. In this book, the authors have incorporated new widely-used operations and have repudiated the practice of useless repetition of out-of-date practices.

The reader will see the demand for greater emphasis on operations and setups brought skillfully and comprehensively to fruition, with specially prepared illustrations to show the operations, safety measures and modern equipment in ultra-clear detail. The book gains further significance in its top-grade treatment of grinding operations.



Conveyors and Related Equipment. Third Edition. By Wilbur G. Hudson. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 524 pages. Illustrated. Cloth binding, board covers. Price, \$9.00.

Expanded by approximately 25 per cent over the previous edition, this third edition offers concrete information on all phases of materials handling and related equipment. The book features new material on fundamental developments of the last three years in belt construction and dynamatic drive control; 1954 costs and designs of silos, bins and bunkers, including the west coast development of the low-cost laminated fir silo; dust explosion hazards; developments in boiler house coal handling and storage; developments in pneumatic conveying which have introduced the method of shipment of flour in bulk and substantial increase in cargo capacity of ships transporting bulk cement through air flotation; the hydraulic transportation of coal in pipelines; and recent expansions in the applications of motorized industrial trucks made possible

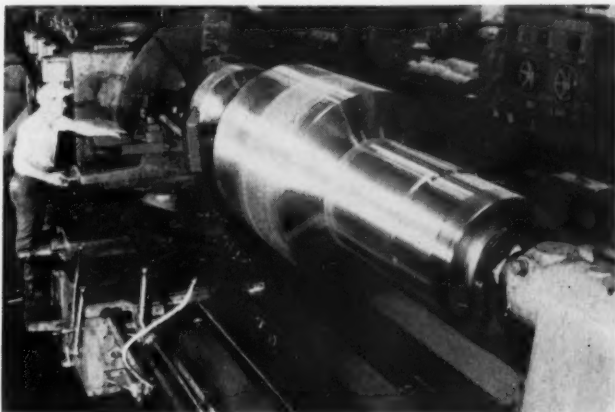
through the development of the two-way radio. Many new illustrations have been added, while obsolete pictures have been deleted. Typical problems and their solutions have been included.

Nickel in Iron and Steel. By A. M. Hall. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 595 pages. Cloth binding, board covers. Price, \$10.00.

This book reviews and correlates all of the important published data on nickel as an alloying element in steel and cast iron. Nearly 800 papers (listed in the bibliography at the end of the book) were reviewed for this manuscript. The introduction of the book is concerned with the occurrence and refining of nickel ores. The rest of the book contains material on such important topics as the physical properties of steels containing nickel; the structure and heat treatment of wrought and cast nickel steels; and the effect of nickel on various engineering properties. Corrosion and the

Turning Huge Forging for Blooming Mill Pinion

THIS alloy steel rough forging for a blooming mill pinion is being turned down to size on a 60-inch Mack-Hemp engine lathe at U. S. Steel Corporation's No. 3 machine shop at Homestead, Pennsylvania. The forge is 14 feet long and has an outside diameter of 48 inches. The shipping weight will be 47,000 pounds.



welding of nickel steels are discussed in detail. The effect of nickel on the constitution of cast iron, its tensile strength and its hardness are a few of the other important subjects treated in this volume. Each chapter is concluded with a summary.

Welding for Engineers. By Harry Udin, Edward R. Funk and John Wulff. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 430 pages. Illustrated. Cloth binding, board covers. Price, \$7.50.

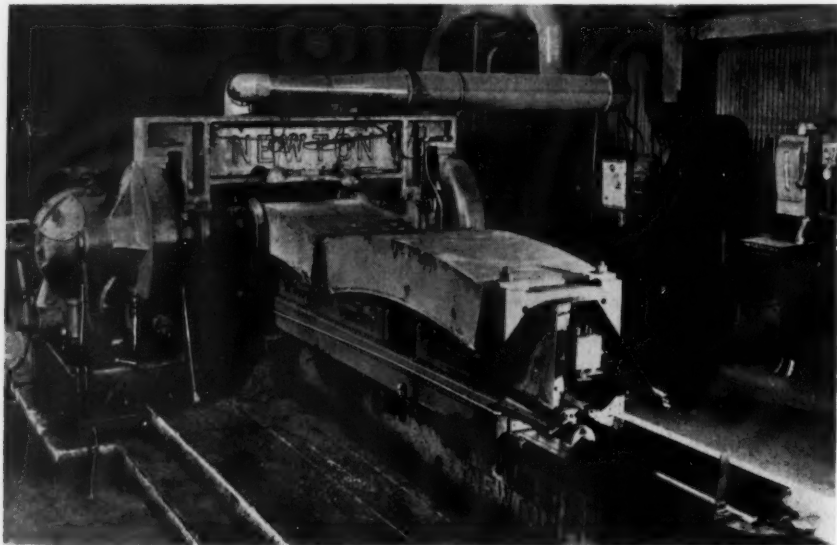
This book offers the reader a thor-

ough appreciation of welding as an art and a science. Welding is here treated as a field in itself rather than as an offshoot of some other discipline. Drawing on principles from physics, mathematics, chemistry, metallurgy and mechanical engineering, the authors carefully construct an understanding that extends not only to welding and joining but to the other arts in the general field of metal fabricating.

Though the emphasis falls on principles rather than practice, the book is so realistic and lucid in its presentation that it equips the engineer with information and an approach that will

Carbide Milling Giant Tunnel Segments

HEAVERY-DUTY straddle milling of 7-foot Lincoln Tunnel segments with home-made 20-in. "catheads" and other special heavy-duty milling cutters employing Wesonmetal carbides is being performed successfully on 28-year-old duplex milling machines at a large eastern foundry and machine shop. The 7-foot segments are 32 in. wide x 14 in. deep and weigh close to a ton each. Earmarked for the third tube of the Lincoln Tunnel, approximately 28,000 cast iron segments are needed. In addition, over 1,800 steel segments will be used at points where the tunnel enters rock to withstand bending stresses.



enable him to deal with a wide variety of actual welding problems. Each unit process is presented as soon as possible after its basic principles have been developed. As understanding progresses, more complicated processes are used for illustration. Wherever possible an analytical approach is taken. The book will provide a ready reference source for all who are interested in welding.

Adhesion and Adhesives — Fundamentals and Practice. Edited by F. Clark, John E. Rutzler and Robert Savage. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 229 pages. Cloth binding, board covers. Price, \$9.75.

This book contains a collection of the papers read at two conferences which were held simultaneously at the Case Institute of Technology and in London, England. At these symposia, the motivating factors were the rapid expansion of high polymers in industrial use and the increasing appearance on the market of more versatile adhesives for use in structures and protective coatings. Discussions in theoretical fundamentals cover such topics as joint strength, solid-solid interfaces, fluids and molecular and intermolecular forces. In the papers dealing with practice, the authors cover the use of adhesives in glass, paper, wood, roads, films, aircraft, plastics, metals, rubber and textiles.

Anti-Friction Die Sets. Over 300 sizes of ball bearing precision and super precision die sets are listed in Lempeco Products new 7th edition catalog of anti-friction die sets, guide post assemblies and accessories. The 192-page book is conveniently divided into seven sections with tab indexes to each section. Die set dimensions are clearly shown by means of prints giving A, B, C, and so on, dimensions cross referenced in accompanying charts. Use of preloaded anti-friction bushing between the guide post and shoe bushing is said to afford a free-riding fit with perfect alignment that prevents premature die wear and failure. The catalog reference includes prints and detail for small precision die sets; small super precision sets; large precision sets; and large super precision sets. A copy of the Precision Die Set Catalog may be obtained by writing to Lempeco Products, Inc., Bedford, Ohio.

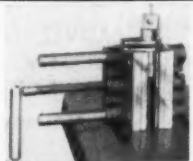
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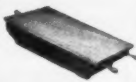
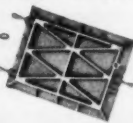
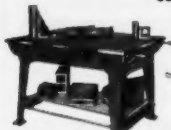


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REPRINTS AVAILABLE

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"High Temperature Alloys Challenge Accepted Machining Methods"	130
"Optical Tooling"	35
"Use Job Evaluation for Sound Personal Policy"	25
"When Turnover Becomes a Problem"	25

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New Films

Wax Coolant Film

A 16-mm., color, sound movie, illustrating the use of wax coolants in the metalworking industry, has been produced by S. C. Johnson & Son, Inc., Racine, Wis. Entitled "Metalworking with Wax," the documentary film describes the properties of wax, as well as its functions in the metalworking process. It begins with a visit to the famous Johnson Administration and Research Center in Racine and then focuses on the work of the company's industrial products department. Use of the complete line of Johnson metalworking lubricants and coolants is shown. One of the highlights of the film is said to be a dramatic demonstration of how a Johnson coolant can reduce lathe chip heat by 400 deg.

The movie will be shown at A.S.T.E. meetings throughout the country and is available for showings from the Johnson's Wax Industrial Products Department at Racine. Running time is 25 minutes.

Electric Tools Film

A 16-mm. full-color motion picture, entitled "Tooling Up for Profits," has been released by Thor Power Tool Co., Aurora, Ill., to company branches throughout the country for showing to distributors and tool users. Third in a series of movies to be produced by the company, the current release covers the case history of the application of Thor electric tools to the assembly of oil burner units at the Columbus, Ohio, plant of the Armstrong Furnace Company. The film graphically demonstrates step-by-step comparisons of hand tool assembly methods with the startling production boost made possible by the application of Thor electric tools to the same operation. The film has a running time of 20 minutes.

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where to get it

(Numbers shown are page numbers in this issue)

—A—

Abrasives, Grain, Cloth, Paper, Disc, etc., 64,
170, 171, 231
Absorbents, Oil and Grease, 264
Adapters, 34, 201, 249
Air Operated Equipment (Look for specific
item)
Angles, 321
Arbors, 34, 164
Automated Equipment (Look for specific item)

—B—

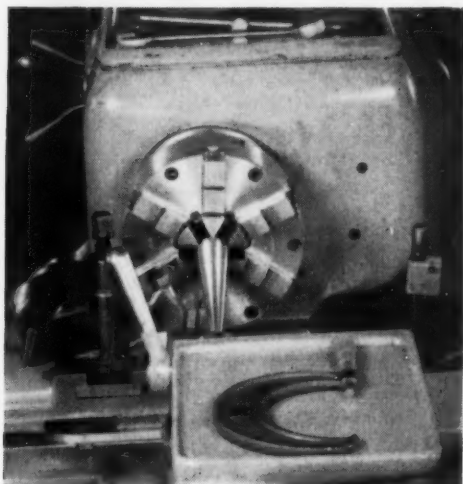
Balancing Machines, 7, 61
Balancing Ways, 232
Bar Stock, 39
Bases, Machine, 297
Bases, Magnetic, 277, 288
Bearings, Ball, First Cover
Bearings, Bronze, 79
Bearings, Motor, 79
Bearings, Roller, First Cover
Bearings, Sleeve, 79
Bearings, Thrust, First Cover, 296
Bench Tops, 184
Benches, Work, 215
Bending Devices, 212, 273
Bending Machines, 18, 30, 35, 127
Bins, 323
Bits, Power, 24
Bits, Screw Driver, 24
Blades, Cutting-Off, 195, 210
Blades, Work Support, 262
Blocks, Magnetic, 33
Blocks, Step, 82
Blocks, V, 33
Bolts, 82, 208
Boring Bars, 147, 151, 205
Boring Heads, 162, 205, 247
Boring Machines, 10
Boring Mills, 19
Brakes, Press and Bending, 38, 44, 45, 48, 49,
127, 248

Broaches, 28, 265
Broaching Machines, 8, 9, 28
Bronze Bars, 79
Buffers, Bench and Pedestal, 291
Buffing Machines, 13, 291, 340
Burs, 165
Bushings, Drill Jig, 60, 167, 191, 198, 206, 238,
249
Bushings, Pilot, 238

—C—

Calipers, 109, 267, 293, 304
Cams, 204, 254, 259, 271
Carbides, 66, 67, 233, 241
Case Hardening and Heat Treating Compounds,
255
Castings, 307
Centers, Lathe, Planer, Miller, etc., 164, 247,
275, 285, 305
Chasers, 217
Chilling Equipment, Industrial, 32
Chucks, Air and Hydraulic, 75
Chucks, Collet, 34, 75, 122, 164, 298
Chucks, Drill, 12
Chucks, Internal, 186
Chucks, Lathe, 325
Chucks, Tap, 75
Clamp Components, 246
Clamps, 47, 82, 246, 267
Clinching Machines, 189
Clutches, 193
Coil Handling Equipment, 263, 292
Collets, 164
Comparators, 115, 247, 249
Compressors, Air and Gas, 16
Controlling Devices, 25, 143, 211
Coolant Separators, 21, 114
Coolants, 8, 9, 133
Counterbores, 179, 313
Countersinks, 152, 165, 179
Couplings, Air, 25
Couplings, Flexible, 296
Cut-Off Machines, 340

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Universal scroll chucks that any machinist can adjust to dead true *in one minute* — and get *.0005" precision on duplicate parts without readjustment*—mean important savings in any shop. J. C. Lore Co., Vineland, N. J. didn't figure it out percentagewise (though others have reported 50% savings) but they did report "considerable" time saved and fewer rejects on their close tolerance work on a 15" Cincinnati lathe.

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where to get it

(Numbers shown are page numbers in this issue)

Cut-Off Wheels, 170, 171
Cutter Sharpening Machines, 8, 9
Cutters, Gear, 225
Cutters, Milling, 145, 165, 194, 274
Cylinders, Hydraulic and Pneumatic, 25, 181, 189, 226

Flexible Shaft Equipment, 46, 141
Floats, 190
Forming Machines, 8, 9, 221
Fume Collectors, 214
Furnaces, Heat Treating, 31, 124, 180, 222, 273, 276, 295

—D—

Demagnetizers, 211
Diamond Compounds, 63, 271
Diamond Wheels, 218, 271, 300
Diamonds and Diamond Tools, 218
Die Cushions, Pneumatic, 38
Die Heads, 217
Die Making Machines, 57
Die Sections, 66, 67
Die Sets, 4, 43, 203
Diemakers' Supplies, 203
Dies, Punching or Forming, 4, 78, 146
Dividing Heads, 259, 284
Dressers, Grinding Wheel, 218
Dressing Fixtures, Grinding Wheel, 268
Drifts, Drill, 164
Drill Heads, 32b, 108, 141, 150, 200, 279
Drilling Attachments, 46
Drilling Machines, Bench, 14, 121
Drilling Machines, Radial, 14, 41, 46, 50, 112
Drilling Machines, Upright, 112
Drilling Machines, Vertical, 18, 32a, 46, 200, 229, 340
Drilling and Tapping Machines, Combination, 50
Drills, Center, Core, Twist, etc., 179, 259, 268
Drivers, Drill, Tap, etc., 34, 201
Dust Control Equipment, 159

—E—

Ejection Sets, Air, 25
End Mills, 6, 145, 165, 315
Engraving Machines, 256
Envelopes, 298
Etchers, 261, 275

—F—

Facing Heads, 265
Feed Units, 251, 292
Feeler Gage Stock, 258
Files, 113, 125
Files, Oilstone, 64
Files, Rotary, 165
Filters, 16, 21, 114
Finishing Machines, End, 131
Flame Hardening Apparatus, 8, 9

—G—

Gage Accessories, 182
Gage Blanks, 182
Gage Blocks, 20, 55
Gage Handles, 182
Gages, 20, 25, 42, 53, 115, 197, 249, 270, 293
Gear Burring Machines, 157
Gear Cutting Machines, 72, 73
Gear Measuring Instruments and Machines, 20
Gear Shaving Machines, 72, 73
Gears and Gear Units, 253, 271, 296
Grinders, Abrasive Band and Belt, 3, 245, 264, 331
Grinders, Air, 128, 253
Grinders, Bench, 13, 291, 331, 340
Grinders, Centerless, 331
Grinders, Chamfer, 177
Grinders, Contour, 331
Grinders, Cutter and Tool, 56, 57, 58, 81, 227
Grinders, Cylindrical, 170, 171, 227
Grinders, Disc, 13, 269
Grinders, Drill, 13, 56, 57, 58, 141, 166, 177
Grinders, Face Mill, 57
Grinders, Flute, 177
Grinders, Internal, 65, 227
Grinders, Jig, 78
Grinders, Pedestal, 13, 291, 340
Grinders, Portable Electric, 141
Grinders, Portable and Tool Post, 13, 141
Grinders, Profile, 8, 9
Grinders, Saw, 251
Grinders, Surface, 56, 58, 68, 69, 71, 81, 227, 245, 327
Grinders, Tap, 242
Grinders, Universal, 36, 37, 65, 76, 77
Grinders, Vertical Spindle, 76, 77
Grinding Fixtures and Attachments, 155, 161
Grinding Heads, 78, 161
Grinding Wheels, 134, 135, 170, 171, 231
Guides, Bandsaw, 253
Guns, Air, 25, 208

—H—

Hammer Molds, 242
Hammers, Air, 286
Hammers, Impact, 286
Hand Tools, Power (Look for specific item)
Handles, Ball, 188

SANFORD

SURFACE GRINDER

MODEL MG

For Dry or Wet* Grinding!
PRECISION • SPEED • SENSITIVITY

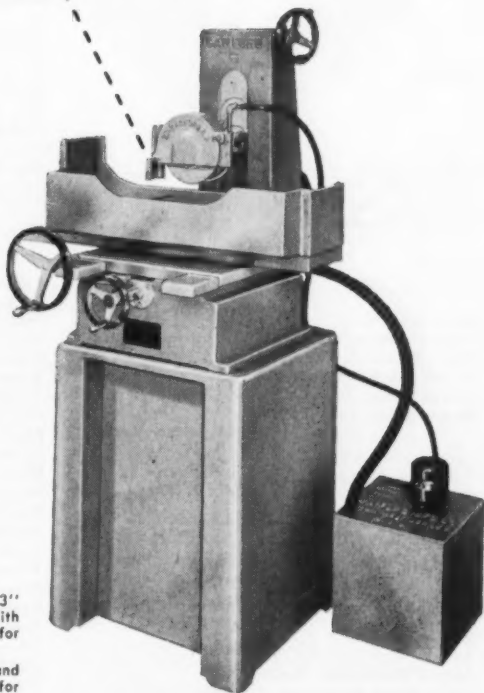
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where to get it

(Numbers shown are page numbers in this issue)

Handles, Machine, 188
Handwheels, 188
Hardness Testing Devices, 187
Hinges, 274
Hobbing Machines, 123
Hobs, 225
Holders, Floating, 75
Holders, Indicator, 277
Holders, Tap, 75, 281
Holders, Tool, 34, 108, 156, 172, 201, 210, 257
Holders, Work, 267
Hose, Air, 25
Hose Fittings, Air and Welding, 25
Hydraulic Equipment (Look for specific item)

—I—

Indicators, 42, 109, 197, 238

—J—

Jacks, Leveling, 230
Jacks, Setup, 82
Jig Bore, 10, 251, 275
Jigs and Fixtures, 185

—K—

Keys, Fixture, 47
Keys, Machine, 269, 323
Keys, Woodruff, 269, 323
Keyway Cutting Machines, 242, 250
Knives, Band, 109
Knobs, Hand, 188

—L—

Lathes, Automatic, 7, 23, 61
Lathes, Bench, 32a, 46, 257
Lathes, Duplicating, 41, 76, 77, Third Cover
Lathes, Engine and Toolroom, 32a, 54, 76, 77,
129, 163, 192, 239, 303, Third Cover
Lathes, Tracer, Third Cover
Lathes, Turret, 7, 32a, 61
Layout Materials, 176, 204
Lifting Machinery, Portable, 228
Light Wave Measuring Equipment, 20
Lighting Equipment, 272
Lubricants, 261

—M—

Magnifiers, 269
Mandrels, Expanding, 75

Marking Devices, 220, 254, 261, 317
Metallizing Equipment, 137
Micrometers, 20, 109
Milling Machines, Bench, 136, 216
Milling Machines, Vertical, 8, 9, 10, 54
Mills, Hollow, 313
Molds, 242
Motors, 141

—N—

Nails, 70
Nibblers, 270
Notching Machines, 127

—O—

Oilers, 25
Oils, Cutting, Second Cover, 111
Oils, Grinding, Second Cover
Oils, Hydraulic, Second Cover
Oils, Lubricating, 183
Oils, Soluble, Second Cover

—P—

Packings, 40
Pads, Toggle, 47
Pantographs, 74, 223
Parallels, 321
Parters, Rod, 127
Parts, Machine Tool, Production, Aircraft, etc.,
146, 323
Pins, Dowel, Taper, etc., 60, 210, 269, 302, 323
Pipe and Stud Extractors, 156
Plates, Angle, 253
Plates, Surface, 215, 284, 321
Plungers, Spring, 47
Polishing Machines, 245
Presses, Air, 16, 226
Presses, Arbor, 219
Presses, Hydraulic, 38, 219
Presses, Power, 38, 266
Presses, Punch, 27, 48, 49, 52, 127, 136, 250, 301
Presses, Stamping, 38
Protractors, 293
Pulleys, 296
Pumps, Coolant and Lubricant, 335
Punches, 66, 67, 146
Punching Machines, 18, 30

—R—

Racks, Gear, 269
Racks, Machine, 269
Reamers, 173, 179, 259

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ARTHUR B. HOMER
President
Bethlehem Steel Corporation



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Why not take a *really personal* interest in your employees and your Payroll Savings Plan?

Pick up the phone, now, and ask the man in charge of your Payroll Savings Plan three questions:

- How many of your employees are enrolled in the Payroll Savings Plan?
- What is the percentage of employee participation?

- When did your company last conduct a person-to-person canvass?

If less than 50% of your employees are enrolled in the Plan... if you have not conducted a person-to-person canvass in the past two years (*or if you do not have the Plan*), act now! Telephone, wire or write to Savings Bonds Division, U.S. Treasury Department, Washington, D.C. You will hear promptly from your State Director, U.S. Treasury Department who will be glad to help you conduct a person-to-person canvass that will put an application blank in the hands of every employee. That is all you have to do. Your employees will do the rest. They want to save for their economic security.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

MODERN MACHINE SHOP



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(Numbers shown are page numbers in this issue)

Reciprocating Tools, 263
Rectifiers, 211
Reels, 25, 292
Refractories, 170, 171
Regulators, 16, 25, 211
Riveting Machines, 189, 266
Rivets, 70
Rod, Plastic, 40
Rollers, 127
Rolls, Bending, 18, 30
Rust Preventatives, 282

—S—

Saw Blades, Band, 109, 260
Saw Blades, Hack, 11, 109, 213
Saw Frames, Hack, 213
Saw Sharpening Machines, 251
Sawing Machines, Band, 46, 213, 294
Sawing Machines, Friction, 30
Sawing Machines, Hack, 27, 59, 178
Scrap Cutting Machines, 259
Scrapers, Power and Hand, 265
Screw Drivers, Hand, 24
Screw Driving Machines, Power, 251
Screw Machines, Automatic, 62
Screws, Cap, Set, Socket, and Machine, 70, 146, 208, 234, 235, Fourth Cover
Screws, Thumb, 47
Screws, Transfer, 188, 275
Second Operation Machines, 243
Services: Milling, Grinding, Lapping, Rebuilding, Repairing, Business, etc., 204, 254, 259, 265, 271, 275, 299, 302, 322
Shapers, 27, 44, 45, 46
Sharpening Fixtures, 217
Shearing Machines, 18, 30, 44, 45, 48, 49, 127
Shearing, Punching, and Coping Machines, Combination, 30
Shears, Hand, 254
Sleeves, 164, 201, 249, 267
Sockets, 164, 201
Spacing Collars, 34
Special Machinery, 7, 17, 28, 61, 78, 185, 252
Speed Reducers, 5, 253, 296
Spindles: Grinding, Boring, Milling, etc., 120, 144, 201
Spring Winders, 127, 271
Springs, 188
Sprockets, 271, 296
Steel, Die, 29
Steel, High Speed, 199
Steel Stock, Ground Flat, 109
Steel, Tool, 39, 66, 67
Stops, Spring, 47
Stops, Stock, 296
Straightedges, 321
Straightening Machines, 54, 221, 292

Strainers, Air, 25
Studs, 208
Superfinishing Machines, 7, 61
Surface Finish Standards, 177
Surfacing Machines, Abrasive, 46
Swaging Machines, 22

—T—

Tables, Drill, 25, 209
Tables, Elevating, 119
Tables, Rotary and Index, 78, 220, 253
Tap Extractors, 156
Taper Attachments, 164
Taper Cutting Attachments, 311
Tapes, Measuring, 109
Tapes, Pressure Sensitive, 64, 170, 171
Tapping Attachments, 108, 153, 224, 281
Tapping Heads, 108, 153, 224, 279, 281
Tapping Machines, 50, 229
Taps, 169, 240
Thread Rollers, Automatic, 2
Threading Machines, 229, 268
Tires, Bandsaw, 253
Tool Bits, 168, 233, 241
Tool Posts, 244
Tool Stands, 293
Tools, Boring, 51, 205, 218, 255
Tools, Broaching, 28
Tools, Carbide, 66, 67, 179, 207, 233, 241, 262
Tools, Deburring, 152
Tools, Facing, 313
Tools, Radius, 238
Tools, Recessing, 34
Tools, Special Cutting, 179, 313
Traps, Air and Steam, 190
Triangles, Shop, 20
Trunnions, Indexing, 74
Turrets, Lathe, Tool Post, Bed and Tailstock, 253

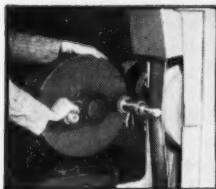
—V—

Valves, 16, 25, 181, 190, 226, 292
Vises, Bench and Machine, 16, 255, 287, 321

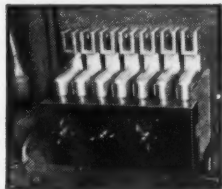
—W—

Washers, 196
Wear Parts, 207
Welding Equipment and Supplies, 15, 46, 258, 283
Wheels, Bandsaw, 253
Wires, Measuring, 20
Work Holding Fixtures, Universal, 257

Do your machining up to 10 times faster!



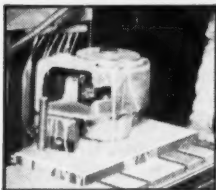
• Originally turned on lathe, now rough and finish-ground at 600 per hour.



• These pieces formerly milled now belt-ground 5 times faster.



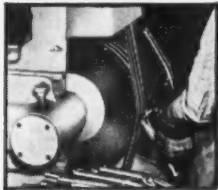
• Grinds broad areas flatter and faster than radial surface grinder.



• This grinding operation 100% faster than former milling time.



• Generates 2 radii at double the output by hand filing and polishing.



• Replaces polishing jack — eliminates costly setting up of glued wheels.

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Abrasive Belt Grinding removes stock rapidly, provides fine finish free of tool marks. Greatly simplifies fixtures — or eliminates them entirely. (Often makes hand presentation possible.) Is up to 10 times faster than milling, shaping, polishing or ordinary grinding — frequently saves 75% to 90% of previous set-up time.

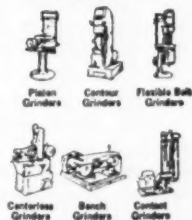
Wet-belt or dry-belt models (determined by material to be worked) available for flat surfacing, contour grinding, centerless grinding, generating radii, beveling, burring and polishing.

Let us prove that an Abrasive Belt Grinder can reduce the cost of many operations. Send us sample pieces for recommendations — or ask to have one of our production engineers discuss your problems at your convenience, at your plant. Free 32-page case history booklet on request.

Announcing...

Porter-Cable Abrasive Belt Grinders are now made and sold by Engelberg Huller Co., Inc. — manufacturers of precision machinery since 1888.

Grinders for every application



The **ENGELBERG HULLER CO., INC.**

110 Seneca Street

Syracuse, N. Y.



the last word

Years of Decisions

AT some time around the beginning of this new year, we venture to predict that you will either read somewhere or someone will solemnly say to you that this is "the" year of decision. We believe that no one can dispute the fact that this will be a year of decision. We also believe that no one can dispute the fact that each year, since the beginning of time, has been a year of decision.

For the business man, and for the production executive in a metalworking plant in particular, each working day is a day of decision and must be recognized as such. When a plant is in operation, production is never on "dead center." Those who are responsible for the production must constantly be thinking of new and better ways of doing the job at hand. If thought is being given to the ways and means of improving current methods or techniques, materials or tooling, then movement is bound to be forward and the curve of progress upward. If, on the other hand, each day is like every other day, with no thought toward improvement, then movement forward ceases and the curve points downward.

Businesses that have reached the seeming pinnacle of success do not stop searching for new ways to improve. We might cite General Motors Corporation as an example. In sales, about ten billion a year, it's the world's largest corporation. It sells more than half of all the automobiles made in the United States. It's a leader in household appliances and

diesel-electric locomotives. It makes tanks, airplane motors, and other supplies for the Defense Department.

The directors of General Motors realize that if they do not continue to grow and expand, make use of every available means for improvement, that they automatically will decline. They have only to look at the experience of U. S. Steel, which company in 1902 during the first full year of operation produced 65 per cent of the nation's steel. Today, its proportion is about one third. U. S. Steel was content with its share of the market, relying on its dominance.

As everyone who watches the business scene can clearly see, General Motors takes no chances of losing its position among its competition. The penalty of leadership in any field, business or otherwise, is to continually improve. And this is true of the industrial giant such as General Motors at the one end as well as the midget XYZ Machine Company at the other.

The year 1955 can be a good year for you. You can help to make it a good year by making the decision right now that it will be a good year and then acting accordingly.

Born Eighty Years Too Soon

THE progress of a nation depends on the efforts of people, individually and collectively, to get ahead, to improve the land, to raise the crops, to find better tools and sources of heat and power, to speed transportation, and to pro-

duce and market the things that are most wanted. In the 34th Annual Report of the National Bureau of Economic Research issued last year, Solomon Fabricant, Director of Research, reviewed the substantial growth of income in relation to population the United States has enjoyed over the eighty-year period covered by the Bureau's studies.

The average per capita volume of goods consumed or added to the tangible capital stock of the nation has been multiplied fourfold. Were we to include in national income the goods and services devoted to the nation's defense, the rise would be greater still.

Income per capita, he observes, has moved forward with considerable irregularity at an average rate of 1.9 per cent per annum. The average family in the United States, according to Mr. Fabricant, had an income of somewhat over \$5,000 in 1953. If we progress at as high and consistent a rate in the next eighty years as in the last, our grandchildren or great-grandchildren will have average family incomes of about \$25,000 of 1953 purchasing power—a level now attained only by the top 1 per cent or so of the nation's families.

Tool and Die Business

THE tool and die industry can look forward to a good business year in 1955, possibly equal to the peak year of 1953, Jack Kleinoder, general manager of Volkert Stampings, told a Forecast Forum sponsored by the Central Connecticut Tool and Die Industry. Mr. Kleinoder cautioned that this optimistic outlook rested on the efforts of the industry to get a share of this business with progressive management practices.

"Let's not blame the other fellow," Mr. Kleinoder said. "Maybe we ourselves are dragging. Fair competition is good for us—it keeps us on our toes. Cut-throat competition, whether practiced by us or our competitors, soon leads to ruin since nobody can stay in business very long while losing money.

"Every shop owner must ask himself if he is keeping abreast of the latest developments and, if possible, taking the lead in some specific field. Is he training his labor force to supply the needed skill for the construction and maintenance of such developments? On these two questions depends the condition of business not only for 1955 but for all time to come. We cannot survive with old fashioned methods of doing business."

A Strike—Civil War

AFTER a bitter strike in a California plant, the union leaders and the company officers sent a copy of the new agreement to all employees along with a significant letter saying, in part: "A strike is a civil war in the industrial field, and, in the field of human relationships, which are affected thereby, a strike has much the same destructive effects as does a civil war within a country.

"During the strike, smoldering resentments, dislikes, disagreements and misunderstandings are created, intensified, and in too many cases, fanned into flaming hatreds. Friendships are broken, suspicion and distrust and false rumors grow into sincere convictions that those on the other side of a dispute are all wrong and those on our side are 100 per cent right. In the heat of battle, many things are done and said which are expressive of our anger and inflamed prejudice rather than of what we really believe in our normal state of mind."

It is interesting to note that the above mentioned letter to employees recognizes the strike as a civil war in the industrial field. Employers need to devote more time and study to doing what is right and just in employee relations. If an employer fails to do this and yields to strike demands, this only invites future strikes.

Fred W Vogel

index to advertisements

(For listing of products offered by these advertisers consult Where To Get It section)

—A—

Accurate Gear Wks.	271
Ace Drill Bushing Co.	206
Aeme Tool Co.	263
Acromark Co.	220
Aget Mfg. Co.	159
Airway Pump & Equipment Co.	208
Albertson & Co., Inc.	289
Allegheny Ludlum Steel Corp.	66, 67
Allied Products Corp.	146
Allen Industries, Alva	250
Aloris Tool Co., Inc.	244
American Broach & Machine Co.	28
American Drill Bushing Co., Inc.	167
American Tool Wks. Co.	41
Ames Co., B. C.	197
Anderson Bros. Mfg. Co.	265
Anton Machine Works	33
Apex Machine & Tool Co.	24
Apex Tool & Cutter Co.	194
Armstrong-Blum Mfg. Co.	11
Armstrong Bros. Tool Co.	82
Arter Grinding Machine Co.	227
Atrax Co.	233
Auto Moulding & Mfg. Co.	274

—B—

Barker Engr. Co.	216
Barnes Co., Inc., W. O.	260
Barnes Drill Co.	114
Bathey Mfg. Co.	323
Behr-Manning (Div. of Norton Co.)	64
Benchmark Mfg. Co.	136

Black Diamond Saw & Machine Wks., Inc.	166
Blake Co., Edward	177
Boggis & Co., H. P.	242
Boye & Emmes Machine Tool Co.	129
Branch Mfg. Co.	296
Bremil Mfg. Co.	254
Brewster-Squires Co.	261
Brown Corp., W. R.	16
Bryant Chucking Grinder Co.	53
Buck Tool Co.	325
Buffalo Forge Co.	18
Bunting Brass & Bronze Co.	79
Busch Co., J. C.	321

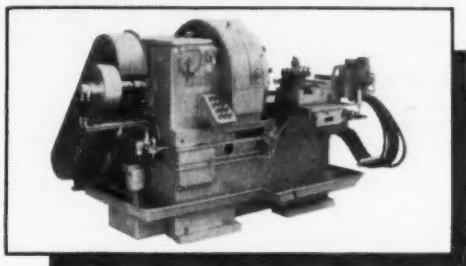
—C—

Carey-McFall Co.	299
Carroll & Jamieson Machine Tool Co.	192
Carter Products Co., Inc.	253
Challenge Mchry. Co.	215
Chicago Gear Works	296
Chicago-Latrobe Twist Drill Wks.	179
Chicago Mfg. & Dist. Co.	261
Cincinnati Bleckford Tool Co.	112
Cincinnati Electrical Tool Co.	340
Cincinnati Gilbert Machine Tool Co.	13, 220
Cincinnati Milling Machine Co.	8, 9
Cincinnati Milling Machine Co., Cincinnati Milling Products Div.	133, 134, 135
Cincinnati Shaper Co.	44, 45
Cincinnati Sub-Zero Products Co.	32
Clark Co., Robt. H.	257
Clemson Bros., Inc.	213
Clipper Diamond Tool Co., Inc.	218
Collis Co.	164

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index to advertisements

(For listing of products offered by these advertisers consult Where To Get It section)

Commander Mfg. Co.	224
Commercial Centerless Grinding Co.	302
Conical Tool Co.	315
Cook & Chick Co.	251
Cook, Inc., L. H.	242
Cooley Electric Mfg. Corp.	180
Covel Mfg. Co.	56, 58
Criterion Machine Wks.	205
Cross Co.	17, 143
Crossley Machine & Tool Co.	321
Crucible Steel Co. of America	39, 199
Cunningham Co., M. E.	317

D

Dake Engine Co.	219
Dakon Tool & Machine Co., Inc.	275
Danly Machine Specialties, Inc.	43
Davis Boring Tool Div., Giddings & Lewis Machine Co.	51
Davis Keyseater Co.	250
Detroit Die Set Corp.	203
Detroit Reamer & Tool Co.	172
Detroit Stamping Co.	258
DeVlieg Microbore Co.	151
Diamond Tool Co.	271
Donovan Mfg. Co.	255
Dreis & Krump Mfg. Co.	248
duMont Corp.	168, 288
Dumore Precision Tools	141
Durant Tool Supply Co.	259
Dykem Co.	176

E

Eastern Centerless Grinding Co.	322
Economy Tool & Machine Co.	249
Edroy Products Co.	269
Eisler Engr. Co., Inc.	259
Electro-Matic Products Co.	211
Empire Tool Co.	195
Enco Mfg. Co.	277
Engelberg-Huller Co., Inc.	331
Engis Equipment Co.	63
Enterprise Machine Parts Co.	230
Erickson Tool Co.	75
Errington Mechanical Laboratory	108
Ex-Cell-O Corp.	191

F

Fairfield Gauge Co., Inc.	270
Falls Products, Inc.	305

Farrel-Birmingham Co., Inc.	5
Federal Products Corp.	42
Fellows Gear Shaper Co.	72, 73
Fitzer Tool Wks., L. A.	311
Flynn Mfg. Co.	162
Foot-Burt Co.	50
Ford Mfg. Co., Inc., M. A.	165
Fostoria Pressed Steel Corp.	272

G

Galland-Henning Mfg. Co.	181
Gallmeyer & Livingston Co.	81
Garlock Packing Co.	40
Gatco Rotary Bushing Co.	238
Genesee Mfg. Co.	313
Gillen Co., John	323
Gisholt Machine Co.	7, 61
Gorton Machine Co., George	223
Gottschalk Co., Ernest	14
Grant Mfg. & Machine Co.	266
Green Instrument Co.	256
Greenlee Bros. & Co.	62

H

Hall Mfg. Co.	298
Halpern & Co., Inc., Wm.	263
Hamilton Tool Co.	119, 121, 123
Hammond Mchry. Builders, Inc.	3
Hannifin Corp.	226
Hardinge Brothers, Inc.	243
Harig Mfg. Co.	155
Hassall, Inc., John	70
Heimann Mfg. Co.	188
Heller Bros. Co.	125
Himoff Machine Co., Inc.	204
Hirschmann Co., Inc., Carl	303
Hisey-Wolf Machine Co.	13
Hjorth Lathe & Tool Co.	271
Holo-Krome Screw Corp.	Fourth Cover
Hossfeld Mfg. Co.	273
Huppert Co., K. H.	273
Huron Machine Products, Inc.	182
Hy-Pro Tool Co.	169

I

Industrial Filtration Co.	21
Industrial Metal Products Corp.	54
Inspection Devices Co.	304

index to advertisements

(For listing of products offered by these advertisers consult Where To Get It section)

J

Jacobs Mfg. Co.	122
Johnson & Bassett, Inc.	74
Johnson Gas Appliance Co.	222
Johnson Mfg. Corp.	178
Jones & Lamson Machine Co.	217

K

Kasenit Co.	255
Kasson Die & Motor Corp.	258
Kennametal, Inc.	207
Kidde Precision Tool Corp.	254, 275
Kling Bros. Engr. Wks.	30
Knight Mchry. Co., W. B.	10

L

L & J Press Corp.	52
L. & L. Mfg. Co.	276
L-W Chuck Co.	259
Lamina Dies & Tools, Inc.	60
Landis Machine Co.	2
Lavallee & Ide, Inc.	173
Leach Mchry. Co., H.	71
Linley Bros. Co.	251
Littell Machine Co., F. J.	292
Littleford Bros., Inc.	297
Lodge & Shipley Co.	Third Cover
Lucifer Furnaces, Inc.	295
Luers, J. Milton	210
Luma Electric Equipment Co.	275

M

Madison-Kipp Corp.	253
Masters	322
Master-Taper Co.	164
Mattison Machine Wks.	245
Mead Specialties Co.	286
Melln Tool Co., Inc.	6
Metallizing Engr. Co., Inc.	137
Michigan Chrome & Chemical Co.	204
Michigan Drill Head Co.	200
Modern Industrial Engr. Co.	157
Modern Machine Tool Co.	26
Morton Machine Wks.	246
Mummert-Dixon Co.	265

N

National Business Publications, Inc.	339
National Tool Co.	225
Neise, Karl A.	255, 267, 284
Niagara Machine & Tool Wks.	48, 49
Nicholson & Co., W. H.	190
Nicholson File Co.	113
Nielsen Tool & Die Co.	275
Nilson Machine Co., A. H.	221
Norma-Hoffmann Bearings Corp.	First Cover
Norton Co.	36, 37, 170, 171
Numberall Stamp & Tool Co.	261
Nu-Tangs, Inc.	204

O

Oliver Instrument Co.	57
Oliver Mchry. Co.	269
Olson Industrial Products Co.	253
O'Neill-Irwin Mfg. Co.	127
Onsrud Machine Wks.	128
Ottmiller Co., Wm. H.	208

P

Peaslee Metal Products Co.	210
Pedrick Tool & Machine Co.	35
Perkin-Elmer Corp.	247
Pines Engr. Co., Inc.	131
Pope Mchry. Corp.	161
Portage Double-Quick Tool Co.	147
Precision Tool & Mfg. Co. of Ill.	247
Procurer Safety Chuck Co.	281
Production Specialties, Inc.	282

Q

Quality Tool Wks.	274
Queen City Machine Tool Co.	291

R

Racine Hydraulics & Mchry., Inc.	59
Radco Corp.	265
Rahn Granite Surface Plate Co.	284
Raymac Mfg. Co.	259
Reading Machine Co.	242
Reid Tool Supply Co.	188
Richards Co., J. A.	212

index to advertisements

(For listing of products offered by these advertisers consult Where To Get It section)

Riverside Foundry	307
Rivett Lathe & Grinder, Inc.	65
Roberts Rubber Co., Weldon	231
Rock Island Millwork Co.	184
Rockford Clutch Div.	193
Rockford Machine Tool Co.	163
Rowbottom Machine Co.	271
Royal Products Co.	247
Ruemelin Mfg. Co.	214
Ruthman Mehry. Co.	335

—S—

Sales Service Machine Tool Co.	27
Sanford Mfg. Corp.	327
Savage Co., W. J.	270
Scherr Co., Inc., George	249, 293
Schmidt, Inc., Geo. T.	254
Schrader's Son, A.	25
Schultz & Anderson	257
Scott-Browne Corp.	257
Scully-Jones & Co.	34
Seibert & Sons, Inc.	201
Seneca Falls Machine Co.	23
Sentry Co.	31
Service Machine Co.	301
Services Directory	322
Sheldon Machine Co., Inc.	239
Sidney Machine Tool Co.	209
Simonds Saw & Steel Co.	29
Skinner Chuck Co.	287
Smit & Sons, Inc., J. K.	300
Smith & Sons, Geo. W.	283
Smith Welding Equipment Co.	15
Snow Mfg. Co.	229
Somerset Tool Co.	268
Sonnet Tool & Mfg. Co.	145
South Bend Lathe Wks.	32a
Speedgrip Chuck	186
Springfield Machine Tool Co.	76, 77
Standard Electrical Tool Co.	120
Standard Gage Co., Inc.	115
Standard Machine & Tool Co., Ltd.	252
Standard Oil Co. (Indiana)	183
Standard Pressed Steel Co.	234, 235
Standard Steel Specialty Co.	269
Starrett Co., The L. S.	109
Sturdimatic Tool Co.	285
Sturdy Broaching Co.	267
Sun Oil Co.	111
Sundstrand Machine Tool Co.	232
Superior Indicator Co.	238
Supreme Products, Inc.	12

—T—

Tamms Industries, Inc.	264
Tapmatic Corp.	153
Teeter, C. B.	238
Texas Co.	Second Cover
Thermo Electric Mfg. Co.	124
Thompson Grinder Co.	68, 69
Thriftmaster Products Corp.	279
Tomkins-Johnson Co.	189
Torrington Co.	22

—U—

U. S. Drill Head Co.	150
Unit Mfg. Co.	228
Universal Engr. Co.	198

—V—

Van Keuren Co.	20
Verson Allsteel Press Co., Inc.	38
Viller Engr., Inc.	47
Vulcan Tool Co.	78

—W—

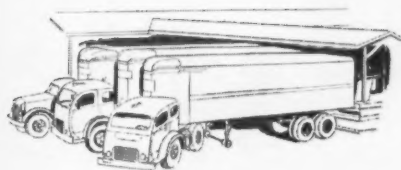
Wade Instrument Co.	298
Walker-Turner Div., Kearney & Trecker Corp.	46
Walls Sales Corp.	264
Waltham Machine Wks., Inc.	268
Walton Co.	156
Wardwell Mfg. Co.	251
Watts Bros. Tool Wks.	268
Webber Gage Co.	55
Weldon Tool Co.	152
Wells Mfg. Corp.	294
Wesson Co.	241
Whistler & Sons, Inc., S. B.	4
Whitehead Stamping Co.	196
Whitnson Mfg. Co.	144
Willey's Carbide Tool Co.	262
Wilson Mechanical Instrument Div.	187
Wisconsin Drill Head Co.	32b
Wohnip Products, Inc.	267
Wood & Spencer Co.	240

—Z—

Zagar Tool, Inc.	185
Zeh & Hahnmann Co.	266



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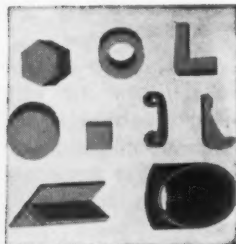
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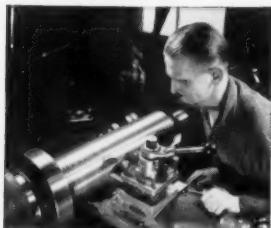
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